RAILROAD GAZETTE

FRIDAY, APRIL 1, 1904.

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Contributions

The Economical Load for a Locomotive.

To the Editor of The Railroad Gazette:

In the paper of Mr. C. J. Noyes, read before the Pacific Coast Railway Club and published in the *Railroad Gazette* of Feb. 5, some very important points are brought out. Also in the discussion of the paper by Mr. B. A. Worthington. Both of these gentlemen lay stress on the time factor in the rating locomotives, a point which seems to have been lost sight of by the average railroad man of to-day. Mr. Noyes says that the addition of five cars to a 40-car train, with an engine working near its maximum rating, means about double the amount of fuel burned. That this is in many cases true is not to be disputed, but the question as to the responsibility for this short-sighted, penny-wise policy is hard to decide. To begin with the tonnage is not usually accurately determined. A yardmaster wants to get the yard clear, if possible, and to him a few cars more is of no importance. One would think at times that he and the master mechanic were working for two distinct corporations. Is it any wonder that engines fail in service or burn too much coal.

Mr. Noyes says as long as the requirements of service necessitate the pooling of engines on any road the lighter load will tend to fewer engine failures, but he considers (and rightly, too) that the single crew on an engine would be a greater factor toward lessening engine failures than the lighter load with the pooling arrangements. These facts are indisputable, but it is still a question with most roads whether it is cheaper to buy engines or repair them. In conversation with the traveling fireman on a large eastern road, he said that while his duties had nothing to do with the engineman or his handling of the engine or train, he could not help noticing the widely different ways of accomplishing the same results, *i. e.*, getting the trains over the road. Some seemed to do the same work so much easier than others, and with a difference in fuel and water consumption. Different men running the same pool engines in the same service obtain widely varying economies. That this is in the men there is not the slightest doubt. But the best of men cannot handle overloaded engines economically.

Mr. Worthington says in his discussion that it is probably not unreasonable to suppose that perhaps we would get better results if we adopted a system of more rigid inspection of engines at terminals, requiring enginemen to report all defects on completion of trips. The results in practice indicate that the necessary work on engines is often not done and this is the cause of many engine failures on the road. A strict rule should be made that no engine be turned out of the house unless able to get over its run without failure. These are the vital points and the points which need the careful scrutiny of motive power officers. It is often the case that engines are turned out of the house with the repairs as reported, not done. The report book is looked over and a great many repairs made with the pencil. If any complaint is made by the engineman the roundhouse force get out of it by claiming they didn't have time to do the work reported. The transportation department wanted an engine and "we had to let her go." What the railroads of to-day want is motive power men who can say when an engine can go.

J. V. N. CHENEY.

Sleeping-Car Comforts.

Richmond, Va., March 15, 1904.

To the Editor of The Railroad Gazette:

In riding on a sleeping car the other night from New York to Washington I encountered a new wrinkle, which it occurred to me would be of interest to your readers. It was a sheet in the berth, which was remarkably free from wrinkles, but which was folded over on the outside so as to cover the blanket for about 20 inches, or more. This is an expedient for the promotion of neatness and preservation of health which was mentioned in your columns some time ago, by a correspondent who had found something of the kind in a sleeping car in England. In the English arrangement, if I remember correctly, the blanket was provided with buttons a few inches from its upper edge, and the sheet, having button-holes in its hem, was thus fastened in position so as to fully protect the blanket. From the standpoint of the sleeping car superintendent the American scheme of folding the sheet over far enough to keep it in place without fastening, is doubtless the better of the two, as the care of button-holes and buttons on sheets and blankets would be a considerable addition to the work of his forces.

Having thrown this very handsome bouquet to the Pullman Company, let me tell of another thing which I found on the same trip; a washroom, with four bowls, which was just about large enough for one good-sized man to turn around in. The area of the room, including the space occupied by the bowls and their shelves was, roughly, 28 square feet! The room was of the usual dimensions crosswise of the car, about 6 ft. 6 in., and in width it was 4 ft. 9 in. at one end and 3 ft. 10 in. at the other, the end farthest from the entrance being narrower than the other half of the room. Of course, this was not a smoking room. The usual combined smoking room and washroom is by no means luxurious in size. In it there are generally enough chairs and other things to take up what lost motion there might otherwise be between the human units, who, in patent office language, are supposed to be able to move freely about in the space available; and, therefore, I do not know as I can say that, the chairs being absent, this "cozy" washroom tangles up one's legs any worse than does the ordinary washroom. But the big easy chair has one merit; although it often succeeds in tripping your feet, it does leave a little room for you to move your arms. In this newly discovered washroom one's upper limbs and lower limbs are about equally hampered. There is, however, one incidental advantage; the walls of the room being at no time more than 1½ inches distant from your elbow, it is very easy to catch yourself in case the lurching of the car threatens to throw you down. For gentlemen—like Mr. Matthias N. Forney and myself—a washroom free from tobacco smoke is a pleasing change; but our pleasure doesn't afford us a tremendous amount of satisfaction when it is accomplished at the expense of so much inconvenience to all other passengers.

M. S. G.

[Our correspondent who complains of wash bowls, "just about large enough for one good sized man to turn around in," is indeed hard to please.—Editor.]

Safety Appliances.*

For about two and one-half years after the Safety Appliance Law became operative, an inspection was conducted that might be considered educational in character. This educational period was essential to familiarize the Commission with the true condition of equipment, and to call the attention of railroad companies to the condition of their equipment by furnishing to them statements of the defects found by inspectors of the Commission, the object being to bring about improvement. I regret to say that the result hoped for—that is, the improved condition of safety appliances—was not fully realized. It became necessary, therefore, for the Commission to adopt a more drastic method, unpleasant as it was; that is, to commence a number of suits for failure of railroad companies to comply with the provisions of the safety appliance laws.

Driving-Wheel Brakes.—The requirements of the law in this respect are practically complied with.

Train Brakes.—Much credit is due to the proper officials for their manifest desire to bring the passenger equipment up to a high standard of efficiency, as exemplified by the constantly increasing use of what is known as the high-speed apparatus. It is to be regretted, however, that the appliances for operating train brakes on locomotives assigned to freight service are in many instances insufficient. I speak of appliances in a broad sense and allude more particularly to the small pump and the inadequate reservoir capacity. Many of the difficulties of the past are fast disappearing, due largely to the better opportunities afforded railroad employees to understand the working and maintenance of air-brake appliances; yet I wish to impress upon you the need, in many instances, of a pump large enough to furnish a greater volume of air, with a correspondingly increased storage capacity. A few years ago, when fewer air-braked cars were used, the smaller pump was satisfactory; but with the long trains of to-day and the greater number of air-braked cars in use, the demand for appliances that will furnish the maximum capacity in all respects seems to be imperative. It has been stated that the use of a larger pump will encourage neglect of the train line; but it is believed that, as the air-brake repair organizations become perfected, this condition need not be feared. On most mountain roads the air-brake is maintained in almost ideal condition, and its aid to safe operation is appreciated, while on many low grade roads we find the maintenance very poor, and are told that the air-brake cannot be relied upon. The same people tell us that on the mountain roads ideally perfect conditions are absolutely necessary. The deduction is that the man who does not feel the weight of necessity is not doing his full duty.

Retaining Valves.—It has been and is now our practice to make no report of the absence of these parts on cars on which this particular appliance has evidently never been applied. But we shall be called upon to report, as defective, all air-brake cars not equipped with the retaining valve. One of the most common causes of brakes being cut out is that engineers complain of not having sufficient air. The fact that the retainer holds air in the cylinder, and thus increases the power of the whole apparatus at the very time needed, appears to be a sufficient reason in favor of its general use. Some experiments are now being conducted in an endeavor to increase the braking power of loaded high capacity cars. This question is one that should be thoroughly gone into.

A road in the Northwest, whose traffic is principally iron ore, has a closed season when very little business is done, and a part of this dull period is taken advantage of to thoroughly inspect and repair all the air-brake apparatus. Other roads having dull periods should follow this example. It is common to do the opposite of this. When business falls off, forces are decreased, and the equipment consequently is in poor shape when needed.

I would like to call attention especially to the 83,000 defects found on 60,000 cars out of 220,000 inspected during the year ending June 30, 1903. As you know, our inspection covers a few parts of the car only. It is not conducted as a railroad company's inspection is, covering all parts of the car, but merely covering "safety appliances."

For the year ending June 30, 1902, out of the total number of defects, 7.84 per cent. were found in couplers and parts, and were separated in this way: Broken coupler body, broken knuckle, broken knuckle pin, broken lock pin or block, bent lock pin or block, wrong lock pin or block, wrong knuckle pin, worn lock pin or block, worn coupler or knuckle, short guard arm, missing parts of couplers, inoperative lock, bent knuckle pin. The percentage last year was 7.83, as compared with 8.39 for this year, showing either that our inspectors are becoming more expert, or that the couplers are getting into a worse condition.

Defects in Uncoupling Mechanism.—Last year 41 per cent. of the defects found by our inspectors were in uncoupling mechanism; this year they are almost 43 per cent. This again shows that our inspection is becoming more expert or there are more defects.

Visible Parts of Air-Brakes.—You understand that our inspection of air-brakes is necessarily confined to visible parts. Last year the percentage of defects found in visible parts of air-brake mechanism was 42½; this year it is reduced to 37. This is really the only encouraging feature in the table, showing that some positive progress is being made, and it is very gratifying to find it in such an important feature as the air-brake.

Handholds and Carrier Irons.—Carrier irons is a feature that we included two years ago. We found such an extraordinarily large number of them loose, and the effect of loose carrier irons had such an important effect on the uncoupling mechanism that we included them in our inspection. This year, I am glad to say, we note a great improvement in that feature. Side sill steps is a new feature, and it is surprising to find the large number of side sill steps in a dangerous condition. I remember that when I was an inspector on a western railway I would pass a good many cars before I would ever think of trying a side sill step. I would see it there and pass right along. I would not think of putting my hand on it, or touching it with my foot to see if it was secure to the car. It is a very important feature. I hope that our calling attention to it in our report will result in better conditions.

Roof Handholds.—As you know, the Master Car Builders have recommended the application of a roof handhold in a longitudinal position, regardless of the location of the ladder, and some trainmen in various parts of the country are taking vigorous exception to that practice. They claim that the roof handhold should be placed in a position relative to the ladder. It is a subject that could well be taken up and thoroughly gone into by this club.

Defects of Couplers.—The item *broken lock pin or block* shows an increase. This defect exists most commonly on foreign equipment. The evident weakness of this part is significant in view of the tendency to employ parts of more or less complex design. There ought to be a thorough investigation of such parts. It would disclose the causes of conditions which are frequently responsible for the necessity of men having to go between the ends of cars to open or adjust couplers. Lack of knowledge of these parts by the average trainman, and in many instances by car repair men, is an added reason

*Extracts from a paper by Mr. George Groobey, Chief Inspector, Interstate Commerce Commission, read at the Feb. 9 meeting of the New England Railroad Club.

why their use should be carefully considered. The necessity for examination of the internal parts when defects exist, requires men to go between the ends of the cars. When this is necessary it implies a defect which means a violation of the law, and a coupler which thus induces men to take dangerous risks is thereby condemned. It is difficult to measure in what degree the individual acts of the trainmen contribute to casualties, but if the couplers were so made that defects could be discerned from a safe position the responsibility of the carriers using them would be reduced. The lack of inspection of couplers and the failure to use the worn coupler gage recommended by the Master Car Builders' Association, is responsible for many difficulties in the operation of trains. In the proceedings of the Master Car Builders' convention in June, 1901, it is stated that it is impracticable to use this gage at interchange points by reason of its requiring the separation of cars. The distance between the front wall of the coupler and the pulling face of the knuckle for new couplers, when the correct contour exists, is 3⅛ in. If, when a train or string of cars is to be inspected, the brakes are set on the rear and the lost motion is taken up by the locomotive, it would seem to be possible to ascertain the deviation from contour by measurement or by an adapted gage, and those parts found exceeding a prescribed danger limit to be established, say, a half inch, could then be given more particular attention. The renewal of a knuckle, knuckle pin, or a lock would often restore a safe contour.

Broken Uncoupling Chain.—This defect is one which is due largely to the difficulty of adjusting and maintaining chains at a correct length and to the use of such a substitute as wire. The extraordinary increase in the number of clevises and clevis-pins missing is evidence of weakness in these small parts. Many casualties which occur during coupling and uncoupling are caused by men having to exert unusual effort to operate a bent lever while running along beside cars in motion. Again, cars receive many severe shocks because of the inability of the men to give signals to the engineer on account of both hands being employed—one in the attempt to operate the lever and the other in holding to the grab iron. This condition is undoubtedly responsible for innumerable failures of parts of the car and damage to lading.

There is an unlimited field for investigation. Committees on subjects for discussion before the various technical associations frequently express their inability to obtain suitable subjects for debate, and it is suggested that when that difficulty arises some item or items be selected from the table accompanying this report, which will furnish ample material. Many of the higher mechanical officers seem to be unable to give the consideration to small defects which is so essential to economical and safe operation. It is to be hoped, therefore, that the railroad clubs and car foremen's associations will take up these matters.

Divided authority is accountable for the existence of defects; a more perfect system is necessary. Often the officer held responsible for the state of equipment is unable to obtain the force he deems necessary to maintain a safe standard, and he consequently feels a lessened sense of responsibility. Upon whose shoulders has this measure of responsibility from which he feels relieved been placed?

For the last three years the number of defects found on each defective car has been for 1901, 1.24; for 1902, 1.28; for 1903, 1.37. This indicates one of two things—either that our inspectors are becoming more expert in detecting the specific defects, or that a greater number of defects are allowed to exist.

For the year ending June 30, 1901, 198 employees were killed and 2,768 were injured in coupling and uncoupling cars. The per cent. of defects found in the uncoupling mechanism for the same period was 66.37 per cent. For the year ending June 30, 1902, 143 employees were killed and 2,113 injured in the same occupation. The per cent. of defects found in uncoupling mechanism for this period was 41.07. Note the decreased number of casualties and the decreased per cent. of defects found in uncoupling mechanism. Is there not some connection between these facts? Shall we not say that improvement in the uncoupling parts would result in a lessened number of casualties to employees whose duty it is to operate these appliances? The percentages of defects quoted are in relation to the whole number of defects found on cars inspected each year.

Underground Brooklyn Terminal of the Long Island Railroad.

Plans have been approved for the underground terminal of the Long Island Railroad at Flatbush and Atlantic avenues in Brooklyn, and the contract for all excavating and masonry work has been let to the Degnon-McLean Contracting Co., of New York. The plans call for the excavation of the block bounded by Fort Greene place, Flatbush avenue, Hanson place and Atlantic avenue, with the exception of a strip of land on Fort Greene place where there are a number of large warehouses. This is the final part of the general scheme for the improvements undertaken by the Long Island Railroad on Atlantic avenue, Brooklyn. The first part of the work, consisting of two concrete subway sections and two elevated sections, approximately five miles long, has already been described at length in our issues of April 25, 1902, and July 31, 1903.

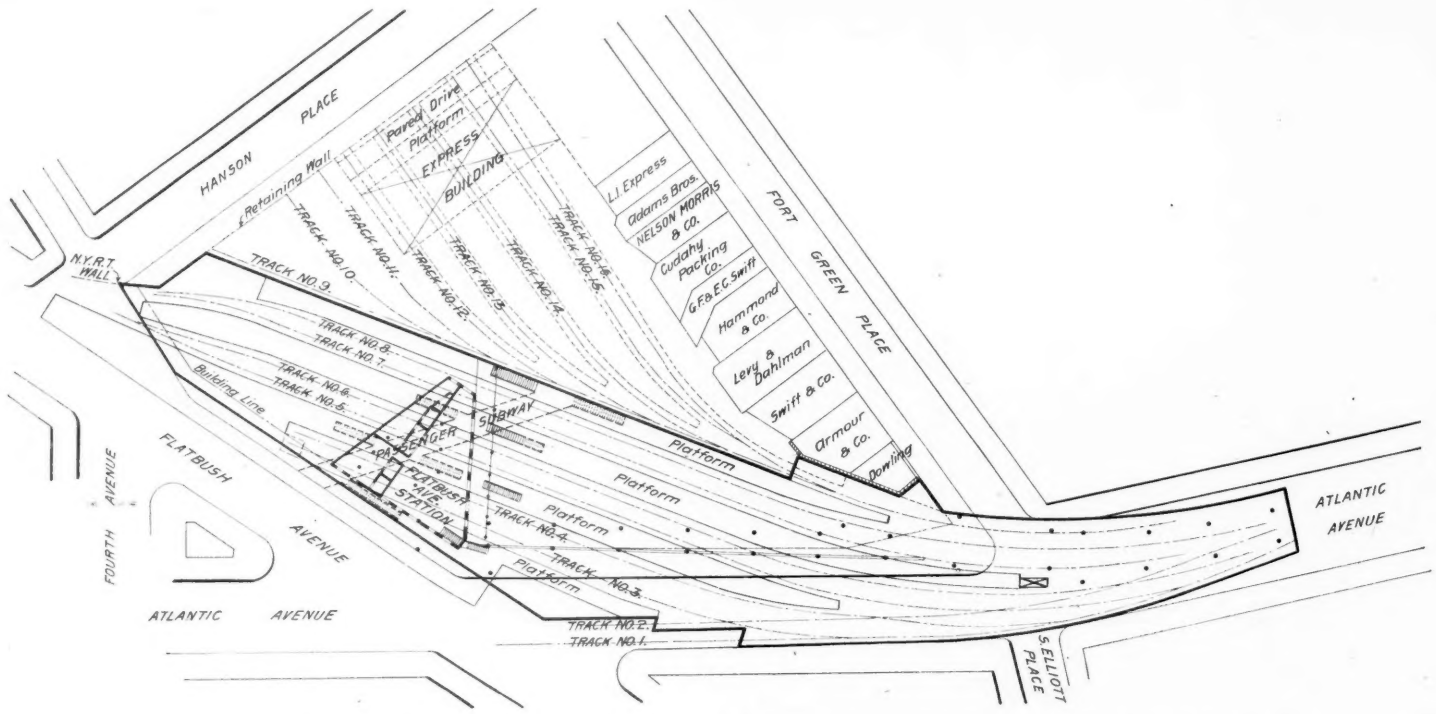


Fig. 1.—General Plan of the Terminal Division of the Atlantic Avenue Improvements—Long Island Railroad.

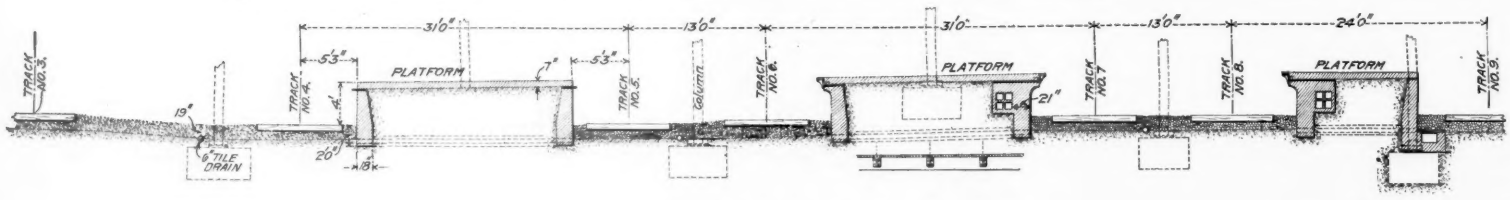


Fig. 2.—Standard Section Between Tracks in Terminal.

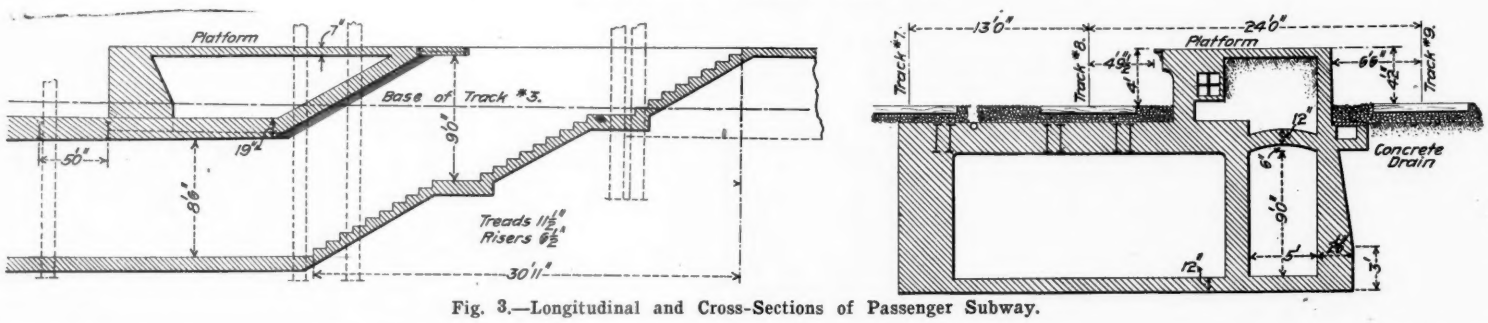


Fig. 3.—Longitudinal and Cross-Sections of Passenger Subway.

According to the plans as approved, the eastern part of the work between Hanson place and Fort Greene place will be left in open excavation, forming a yard at a level of about 20 ft. below the surface of the street. This yard will contain eight tracks, seven of which will be used to handle incoming and outgoing express. Five of these tracks will run under the roof of an express shed at the extreme northeast end of the yard, and the remaining two will terminate at Hanson place. The shed will be 150 ft. x 100 ft. and will contain four elevators for the transfer of goods from the yard tracks to the express house proper. Running back from the building line of Hanson place will be a paved court 22 ft. long where wagons may back up against a raised platform extending out from the express house for a distance of 15 ft. The remaining track, No. 16, will be used exclusively for the special service of the large meat-packing houses on Fort Greene place. These warehouses will remain unchanged and will receive their meat directly from this special track by means of elevators. Each building will have its own elevator which will connect with a concrete unloading platform extending out alongside the special meat track, thus greatly facilitating the unloading of the cars. These elevators will be of uniform

size, being 8 ft. long x 5 ft. wide. It was at first decided to build a heavy retaining wall under these warehouses the same as is being built on the south side, but the plan now accepted provides for supporting the warehouses on lighter concrete retaining walls. The present building walls will be temporarily supported on jacks while the excavating is being carried on underneath. As soon as the excavating is completed concrete retaining walls, ranging from 5 ft. 6 in. wide to 5 ft. 10 in. wide at the base and from 15 ft. to 16 ft. high will be built underneath the warehouses and bonded into the lower courses of the existing wall by removing one or more courses of brick. After the concrete has set the building walls will be lowered so as to rest on the underpinning.

The western section, occupying a space 900 ft. long by 150 ft. wide, along Atlantic and Flatbush avenues, will be entirely roofed over. It will be a four-track subway section running from a connection with the two tracks of the Atlantic avenue subway at a point north of South Elliott place and passing under the present passenger station at Flatbush avenue, which is on the surface of the street, to Hanson place and Flatbush avenue. At this point it will eventually connect with the New York Interborough Rapid Transit subway now building. The four tracks will diverge at South Elliott place, as shown in Fig. 1, one going into the yard and the remaining three lines branching out into four main tracks and two stub tracks. These six tracks will be intersected in two portions by two island and two side platforms, so that one track will go on each side of the platforms. Beyond these platforms the four main tracks will again converge into two tracks at Hanson place, where they will connect with the New York tunnel, as stated above. The present station on Flatbush avenue will be utilized in connection with the new work and will be held up by temporary underpinning while the work of excavating is in progress and until the retaining walls and roof of the new subway structure are completed. Four stairways will lead from the floor level of the present station down to the train platforms, and from these platforms other stairways will lead down to a transverse passenger subway running diagonally across under the tracks, making it possible for passengers to go from one train platform to another without crossing any tracks. The subway floor level is 11 ft. 9 in. below the base of rail. A longitudinal section of one of these stairways is shown in the drawing, Fig. 3, and projected from it is a cross-section of the main subway. The roof of the passageway leading from the stairs is supported by 15-in. I-beams resting on the side walls and spaced 5 ft., center to center. The main subway and the passageways leading to it have 8 ft. 6 in. clear head room; the passageways are 5 ft. wide and the main subway is 15 ft. wide. Where the tracks pass over the main subway the roof is supported by two 24-in., 80-lb. I-beams placed under each rail and spaced 1 ft. apart center to center of webs. The side walls of the main subway are 3 ft. thick and are carried up with parallel sides to the roof line. The roof is concrete, 2 ft. 2 in. thick. Broken stone ballast, 1 ft. 1 in. deep, in which the ties and rails will be bedded, will be laid directly on top of the concrete.

In the construction of the western section from beyond South Elliott place to Hanson place, the roof of the subway is close to the surface of the street and the tracks are only about 20 ft. below the floor of the old station. A part of the south retaining wall on Atlantic avenue is now practically completed and the excavation will begin at that point. The retaining walls will be of concrete, ranging from 14 ft. 10¾ in. to 14 ft. 1 in. wide at the base and 2 ft. 3 in. wide at the top. The roof is supported by 24-in. I-beams in the portions of work where the strain above ground is the greatest and by 12 and 15-in. I-beams in other places. It will be protected by ⅜ in. of roofing felt and pitch waterproofing over which there will be a 1-in. cement covering. Before this has been thoroughly set, bricks will be laid on the top and the whole surface will be grouted in with mortar.

Fig. 4 shows a typical section of the Hanson place retaining wall through one of the expansion joints which are spaced 30 ft. apart. Tapered wooden blocks, 6 in. x 6 in. at the top and 5 in. x 5 in. bottom and 4 ft. long will be built into the concrete in a vertical row across the wall, the blocks being turned so that the diagonal corners are in line with each other and a space of 3 in. separating them from each other. As soon as the concrete has set the blocks will be loosened and raised with the progress of the building of the wall. The spaces thus left empty will be allowed to remain until four weeks after the wall is finished and will then be filled with wet concrete solidly rammed. This will form a series of square dowels across the wall and bond the two sections together.

A section of the roof, retaining walls and tracks, as shown in Fig. 5, is typical of the construction that will be used at the extreme northwest point of the present work, where connection will be made with the Atlantic avenue subway. At this point the roof will be supported by 24-in., 80-lb. I-beams and by a row of 10-in. columns placed under the pillars of the elevated structure and thus dividing the track leading into the yard from the three main tracks leading into the terminal. In order to avoid wreck from derailment, these columns are to be protected at the bottom by a concrete wall 4 ft. 6 in. high from base of rail and extending out several feet beyond the column. The special form of foundation support for these columns is shown in Fig. 5.

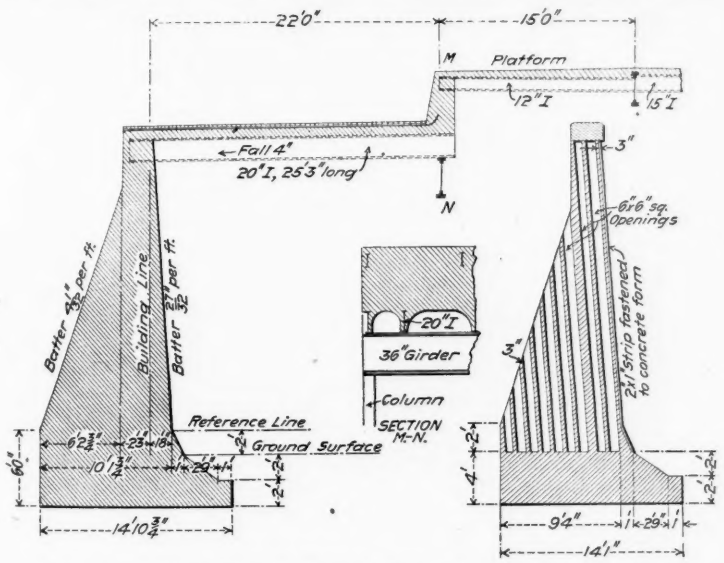


Fig. 4.—Sections Through Hanson Place Retaining Wall, Showing Contraction Joints.

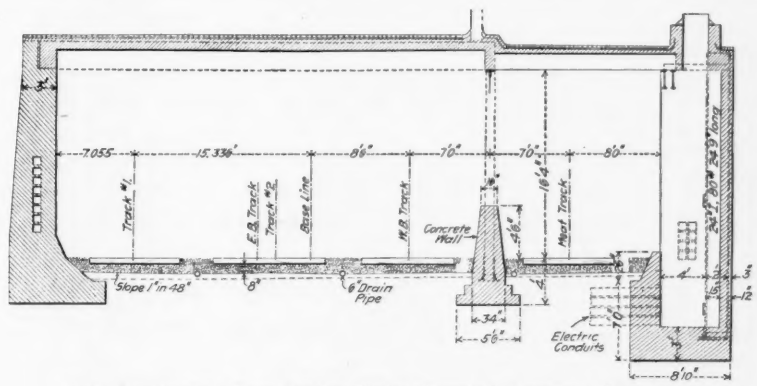


Fig. 5.—Typical Cross-Section Under Elevated Structure, Showing Protection Wall for Columns.

While the work of excavating is going on a bridge will be built for the surface traffic over Atlantic avenue. As soon as the roof is finished and the tracks and platforms completed, the passenger traffic will be diverted from the present station to a temporary station on the surface of the street so as not to interfere with the traffic on the Atlantic avenue division, while work is going on in the yard to the east. It is estimated that it will take about fifteen months in which to finish the work. When it is completed the Long Island Railroad will have successfully accomplished what it originally planned to do in 1899 and which was made possible by the passage of the Wagner bill in the Spring of 1901, providing for the removal of all tracks at grade along Atlantic avenue.

We are indebted to Mr. J. Vipond Davies, Chief Engineer of Construction, to Mr. George Sargeant, Jr., Principal Assistant Engineer, and to Mr. M. J. Carmalt, Resident Engineer, for the drawings shown.

Southern Pacific Inspector of Train Service.

The General Manager of the Southern Pacific has lately issued the following circular:

Mr. J. G. Sullivan is hereby appointed Inspector of Train Service, with headquarters at San Francisco. He is to observe and report on the following:

1. Condition of passenger train equipment and the general appearance of trains; cleanliness and freshness of coaches both inside and out; ventilation; condition of toilets, drinking water; lighting and heating apparatus; windows; plush and seat fixtures, etc.
2. Condition of equipment and character of service in sleeping and dining cars.
3. Condition of waiting and baggage rooms and toilets, and treatment of the traveling public at stations.
4. Respect paid to flagging rules and signals; condition of train and locomotive markers, switch lights and targets, fixed station and block signals.
5. Failure to maintain schedules and reasons therefor; excessive speed, etc.
6. The relation of train and station employees to the public; condition of uniforms, badges; attention to duty, etc.
7. In general, any other matters connected with train and station service not up to requirements.

General reports will be made to the General Manager direct. Questions of detail relating to dining car service will be taken up with the Superintendent of Dining Car Service direct; details relating to other duties prescribed should be taken up with Division Superintendents.

J. KRUTTSCHNITT, *General Manager.*

The inspector, who probably will have a number of assistants to aid him in the work of inspecting the 9,000 miles of the Southern Pacific lines, will devote his attention more particularly to the things named in paragraphs 1, 2 and 3 of the circular; but observations under the other four heads can, of course, be made at any time, the aim being to provide a helper and adviser for each division superintendent.

So far as concerns the testing of enginemen and other trainmen in observance of signals, this order is nothing new, for such testing has been in vogue on the Southern Pacific for over a year. This is managed, of course, by the division superintendents and tests are carried out under a general order which outlines each test as follows:

After giving date, place, etc., state whether or not signal was answered? Was train brought under control? Was train stopped and flagman picked up? Was signal to proceed answered properly? If fusee was encountered, was rear flagman whistled out? Was flagman called in before proceeding? By whom was test made?

The kinds of tests are the following: 1. Torpedoes; 2. Fusees; 3. Slow flag; 4. Stop (red) flag; 5. Switch light out; 6. Switch light reversed; 7. Block signal at danger; 8. Railroad crossing semaphore at danger; 9. Light out in station semaphore; 10. Light out in block semaphore; 11. Station semaphore at clear, operator on duty; 12. One marker left red on rear of train on siding; 13. Headlight uncovered on train on siding; 14. Yellow lantern; 15. Red lantern; 16. White lantern; 17. Hand signals; 18. Station semaphore at danger.

Superintendents are not required to make all the various tests each month, but omissions in any one month should be covered in the following month. Any evidence of a tendency to not properly observe a test should be followed by frequent repetition of same until results obtained are thoroughly satisfactory. Following is a statement of signal tests made in the month of February:

Division—	R.	F.	Efficiency, per cent.
Coast	29	0	100
Western	25	1	96
San Joaquin	43	3	94
Los Angeles	28	0	100
Tucson	33	0	100
Sacramento	33	0	100
Oregon Lines	19	0	100
Salt Lake	62	2	97
Sonora	4	0	100
Pacific System	276	6	98
Division—			
M. L. & T., and L. W.	14	1	93
T. & N. O.	30	0	100
Houston	24	0	100
El Paso	30	0	100
Victoria	24	1	96
H. & T. C., 1st	41	0	100
H. & T. C., 2d	32	1	97
H. & T. C., Austin	32	0	100
H. E. & W. T.	25	1	96
Lines East of El Paso	252	4	98
All Lines	528	10	98

"R" = Respected. "F" = Not respected.

Below are the inspector's notes on the ten failures shown in the foregoing table:

Pacific System, Western Division: February 18. Train 222. Engineer failed to stop to ascertain cause of light out in station semaphore. Claims he saw blade drop.

San Joaquin Division: February 5. Tehachapi. Train 104. Semaphore light out. The blade cleared, and the engineer could see its movement by light of headlight.

February 3. Caliente. One caboose marker left at red. Train 104 passed it without taking exception to it.

February 2. Keene. Extra 2683 on siding for 104: left one caboose marker red and train passed it without exception.

Salt Lake Division: February 26. Cluro. Extra did not stop for red flag. Shut off steam, but did not answer signals.

February 26. Cluro. Extra 2181. Tested with red flag. Shut off steam and answered signal, but did not answer clear signal.

Atlantic System: H. E. & West Texas. February 15. Lalana. Extra 30 approached No. 8 having one marker left at red. The danger signal was observed and train reduced speed, but did not stop.

Second Division, Houston & T. C. February 12. Red fusees laid in front of train second 21 were entirely disregarded. Excuse was made that the signal was within yard limits.

February 16. One torpedo placed in front train 320 on

the Victoria branch. Engineer whistled flagman back promptly, but the flagman went back only 100 ft. He stayed until called in. The train proceeded without ascertaining cause of flagging ahead.

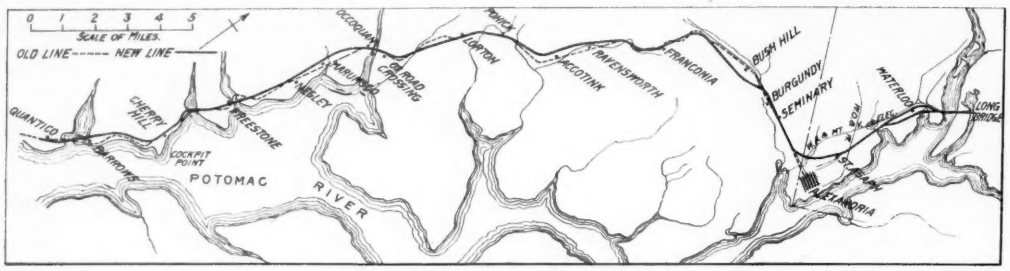
February 23. Train 125. Train order signal at clear. [Should have been cleared after engineman came in sight.] Not observed by engineman.

Revision of Grades and Double-Tracking on the Richmond, Fredericksburg & Potomac.

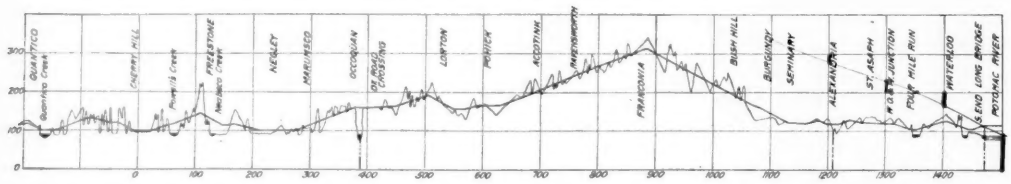
The Richmond, Fredericksburg & Potomac Railroad, which has the unique distinction of being controlled in the joint interest of six separate railroad companies, was chartered in Virginia in 1834. The first part of the road, from Richmond to the South Anna River, was opened in 1836, and in 1872 the entire line from Richmond to Quantico, 81 miles, was opened for traffic. Connection was made at the latter point with the Pennsylvania Railroad and a through line to Washington was obtained. This latter half of the road, from Quantico to the south end of Long Bridge, 32½ miles, is known as the Washington Southern and is now operated as a part of the Richmond, Fredericksburg & Potomac. Owing to the strategic importance of the R., F. & P. as one of the connecting links between the North and South and the large freight and passenger traffic resulting, the company decided, in 1900, to revise the existing alinement and to double track the entire line between Richmond and Washington.

Work was begun on the southern part of the line in April, 1902, and a year ago the second track was completed between Richmond and Ashland, 10 miles. During the past year work has progressed at a rapid rate, until now the greater part of the grading on the entire line has been completed and second track has been laid between Ashland and Summit. The improvements planned and partly carried out consist not only in building a second track along the present line, but in several places of changing the alinement and abandoning the old grades and curves. At no point, however, does the new line diverge more than half a mile from the old roadbed. Many of these changes have been absolutely necessary, owing to the fact that when the line was originally built, in 1834, there was very little traffic, and, as is the case in all pioneer railroads, it was necessary to locate the line as cheaply as possible by avoiding the heavier and more expensive work. This resulted in the building of the line with a number of reverse curves and heavy grades, which have greatly retarded the speed of the through express trains to the South. It is estimated that the new line will reduce the present three-hour running schedule between Washington and Richmond about 45 minutes.

As an example of the more important changes which are being made, the maximum curve on the new line will be only 2 degrees, as compared with the maximum curve of 8 degrees now in use on the present line at Cockpit Point, 3½ miles north of Quantico. This has been accomplished by substituting a number of tangents for reverse curves. Grades have also been reduced materially, so that the maximum northbound grade on the new line will be .6 per cent. and the maximum grade southbound .8 per cent. This has involved a large amount of cutting; but owing to the character of the country on the southern part of the R., F. & P. proper, most of this cutting has been through gravel and loam and the spoil has been removed by means of steam shovels. On the Washington Southern, however, the cutting has been partly through soft sandstone. The heaviest work on the Richmond, Fredericksburg & Potomac is just north of Summit, where there is a 54-ft. cut. There is one cut on the Washington Southern near Freestone which is 90 ft. deep, 1,400 ft. long and necessitated the removal of about 300,000 cu. yds. of gravel.



Revisions on Washington Southern.



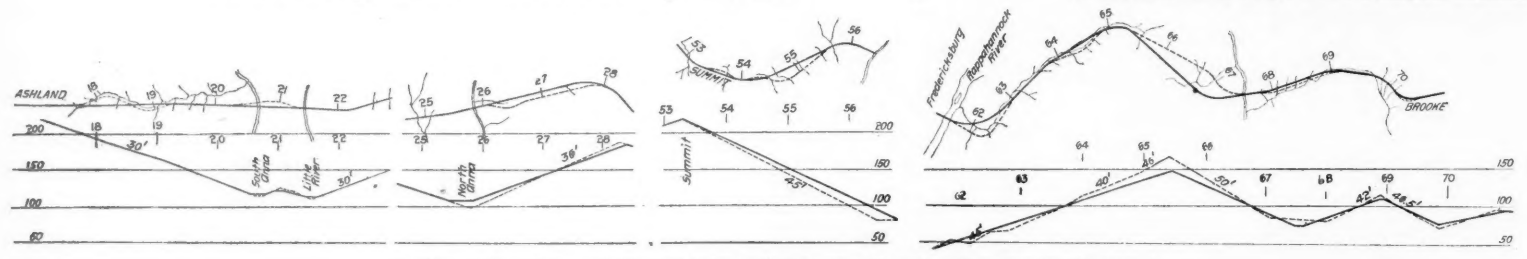
Profile of Changes in Alinement on the Washington Southern.

The system of ballasting the line has not been changed and gravel ballast is being used as heretofore. This gravel is of excellent quality and is obtained from some large pits along the line north of Quantico. Sidings, ranging between 3,000 and 5,000 ft. long, are being built about five miles apart on the new line. These sidings will be controlled by a distance signal at the extreme end of each siding denoting when the main track is clear. On the main line the manual system of block signaling is used with a slight addition, which consists in a small semaphore which is placed on the same pole about midway between the block signal and the base of the pole. In cases where the line is single track one train order is used, but where there is double track a second blade is added. The greater part of the double track is being laid with 85-lb. rail and 100-lb. rails, replacing the 70-lb. and 75-lb. rails now in use.

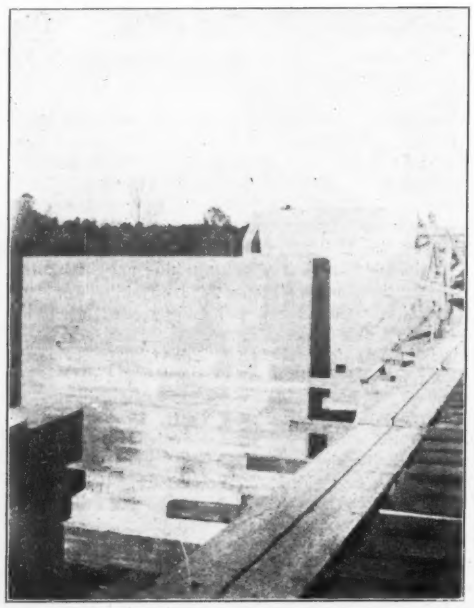
Permanent bridge work is being carried on in connection with the second-track work and grade reduction. The total number of bridges and trestles on the R., F. & P. proper is large, but in many cases, where these bridges are built over small streams, the only change will be that a bridge similar to the one now standing will be built for the second track. The most important changes in bridge work are over the South Anna and North Anna rivers, where entirely new structures are being built. In the former case the new route leaves the present line a few miles north of Ashland and crosses the South Anna River at a point 100 yards higher up stream. The viaduct over this river, which was completed on Oct. 31, 1903, by the American Bridge Co., is one of the most interesting pieces of bridge work on the new line. It is a plate-girder deck bridge, 600 ft. long, with 12 spans supported on steel bents which rest on concrete piers. These piers are sunk to a rock foundation 20 ft. below the bottom of the river. The accompanying photograph shows the construction of the South Anna viaduct in detail. The North Anna bridge is 331 ft. long, with six concrete piers ranging in height from 25 ft., the height of the south abutment, to 51 ft. and 52 ft., the height of piers 1 and 2 respectively, between which is the river span, which is 92 ft. long. The piers average about 15 ft. wide at base, are 26 ft. long and 6 ft. 2 in. wide at the top. The crown is surfaced by four rails laid base up and held together by tie rods. The concrete bed is faced off level with the top of the rails and upon this are placed the plates for holding the girders. The reason for building heavy piers is due to the fact that the North Anna River frequently rises to such an extreme height that a lighter structure would not be able to withstand the strain.

On the Washington Southern the work is heavier and the new line does not follow the old route as closely as on the R., F. & P. proper. The number of curves eliminated on this portion between Quantico and the south end of Long Bridge is 17, and the maximum curvature has been reduced to 2 degrees, with the exception of one 5-degree curve. The total length of the new line is 31.7 miles, or a fraction of a mile less than the present route. As stated above, there are several heavy cuts on the Washington Southern, the deepest being at Freestone. The earth from these cuts has been used for filling in at various places along the line. There has been a large amount of filling on the Washington Southern owing to the fact that the new road crosses several stretches of marsh and sink land. In one case, approximately 40 ft. of filling was required to bring the grade up to a 6-ft. level. Owing to the number of small creeks which the road crosses, it has been necessary to build a large number of culverts. In many cases concrete double-arch culverts ranging from 30 to 20 ft. long have been substituted for the present bridge construction. In some cases bridges will be used made of piles driven deep into the mud capped with iron, with I-beam construction for the support of the tracks.

We are indebted to Major E. T. D. Myers, President, and to Mr. S. B. Rice, Roadmaster, for the above information and to Mr. Augustus Mordecai, Assistant Roadmaster, for his help in the inspection of the line.

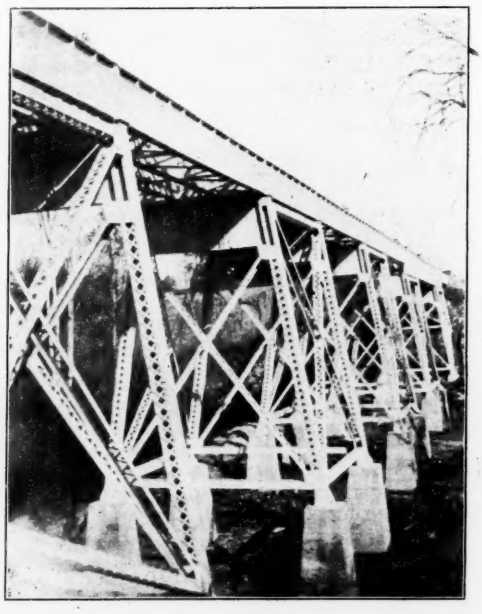


Profile of the Richmond, Fredericksburg & Potomac, Showing Changes in Alinement.



R. F. & P. Bridge Over North Anna River Showing Concrete Piers.

Austria is building in the eastern Alps in connection with a new route to its harbor, Trieste, what will be probably the costliest mountain railroad ever undertaken at one time, including a number of very long tunnels, in some of which great difficulties have been met, especially in excavating carboniferous strata, when mine gas is encountered. The Bosruck Tunnel of the Pyrn Railroad will be 15,581 ft. long; the Tauern Tunnel 27,651 ft., of which 3,862 ft. had been excavated at the end of 1903. The Karawauken Tunnel will be 26,062 ft. long, the Wochein Tunnel 20,700 ft. The latter is far advanced. The railroad extending south from this is extremely costly. It is to cross the Isonzo by a stone bridge with an arch of 262 ft. span.



New Bridge Over South Anna River on Richmond, Fredericksburg & Potomac Railroad.

Organization of the Boston & Maine.

The Boston & Maine organization presents several features which differ quite widely from any thus far considered. It is clearly departmental in character, the entire engineering force reporting through the chief engineer to the general manager, so far as new construction is involved, while the division superintendents divide their allegiance, reporting for operation to the general superintendent, but to the assistant general manager on questions of maintenance. Thus, roadmasters and bridge supervisors report through the assistant general manager, while the assistant superintendents, 14 in number, are not directly concerned with questions of maintenance, but are confined to operation, reporting through their division superintendents to the general superintendent. The most unusual feature of the organization is the divided work of the division superintendents, who report to one headquarters on operation and to another on maintenance, so that it might be said that a divisional organization exists inside the departmental one, the scope of the division superintendent being more extended than that of either of his chiefs.

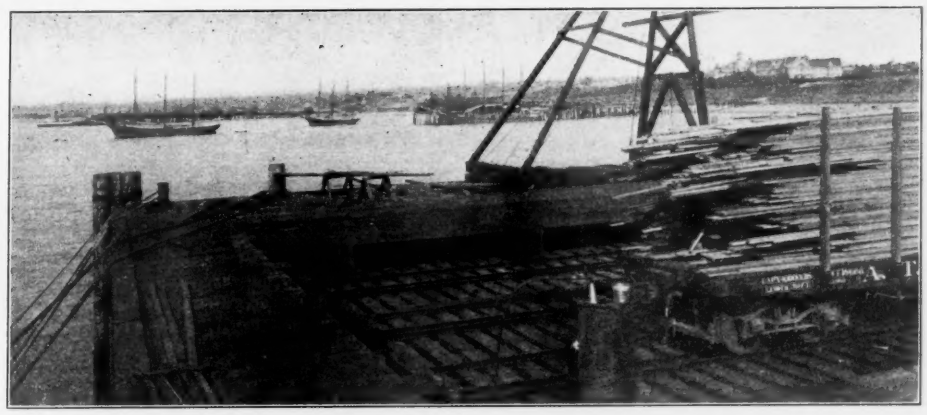
We are indebted to the courtesy of Mr. W. J. Hobbs, Comptroller and General Auditor, for information furnished.

ORGANIZATION OF THE BOSTON & MAINE.

- President and Chairman of Board.
  - 2d V. P. & Gen. Traf. Mgr. — Traffic.
    - Freight Traffic Manager.
      - Asst. Gen. Freight Agt.
      - General Agent.
      - Trav. Freight Agts. (8).
      - Division Freight Agent.
      - Canadian Freight Agent.
    - Export Freight Traffic Mgr.
      - Foreign Freight Agent.
    - Gen. Pass. & Ticket Agent.
      - Asst. G. P. & T. Agts. (3).
      - Gen. Baggage Agent.
      - N. E. Pass. Agent. — Asst. Gen. Baggage Agt.
      - Gen. Western Pass. Agt.
      - Division Pass. Agents (2).
      - Canadian Pass. Agents (2).
      - Traveling Pass. Agents (2).
  - 3d V. P. and Gen. Mgr. — Operating.
    - Asst. General Manager.
      - Division Supts. (8)
        - Roadmasters. See Foremen.
        - Bridge Supervisors (8).
      - Maintenance of Way.
    - General Superintendent. — Operation.
      - Division Supts. (9).
      - Supt. Car Service.
        - Asst. Superintendents (14).
        - Conductors and Trainmen.
        - Station Agents.
        - Trainmasters.
        - Train Despatchers.
      - Supt. Telegraph.
    - Chief Engineer.
      - Asst. Chief Engineer.
      - Bridge Engineer.
      - Div. Engineers (4).
      - Mechanical Engineer.
    - Supt Motive Power.
      - Asst. Supt. Motive Power.
      - Master Mechanics (9).
    - Master Car Builder.
      - Gen. Foreman of Shops.
    - Supt. of Signals.
    - Purchasing Agent.
    - Chief Electrician.
    - Fuel Agent.
    - Real Estate Agent.
  - Comptr. & Gen. Auditor — Financial & Accounting.
    - Treasurer.
      - Asst. Treasurer.
    - Paymaster.
      - Asst. Paymasters.
    - Asst. Gen. Auditor.
    - Chief Traveling Auditor.
      - Traveling Auditors (6).
    - Auditor Pass. Accounts.
    - Auditor Freight Accounts.
  - General Solicitor. — Legal.
    - Assistant Solicitor.
    - Assts. to Gen. Solic'r (2).
    - Attorneys.
    - Conveyancer.
    - General Claim Agent.
      - Claim Agents (7).

Comparison of Steam and Electric Working, Los Angeles & Redondo.

The Los Angeles & Redondo Railroad runs between the points named in California, a distance of 17 miles. It was chartered as the Redondo Railway Company in 1889. The road was opened in 1890 and the title was changed to the above in 1896. Until 1902 it was operated as a steam railroad, but during that year it was electrically equipped with the overhead trolley system and has proved very successful. The road is interesting because it does the regular work of a steam railroad with electric equipment. The wharf shown in one of the photographs is at Redondo, and handles carload lumber and merchandise direct from ships' tackle to Los Angeles and intermediate points. Electric locomotives that vary in weight from 20 to 25 tons handle this freight in cars, as shown in the accompanying illustrations. The motor cars are each equipped with four Westinghouse motors and furnish storage space equivalent to that of an ordinary box car, in addition to which they haul four or five loaded freight cars as trailers over a maximum line grade of 2½ per cent.

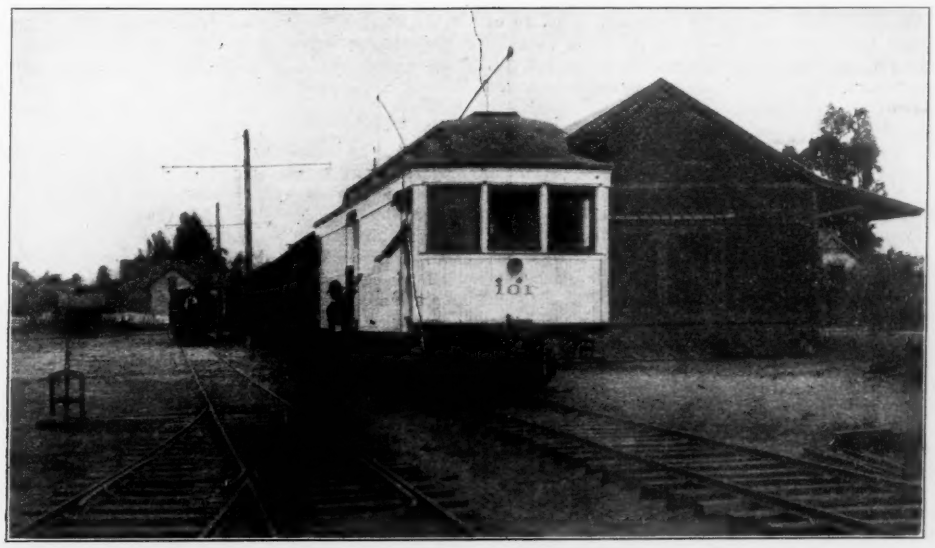


Redondo Wharf, Owned by Los Angeles & Redondo Road.

Up to about two years ago the company had built up a very material freight business over its steam lines between the terminals. In 1902 a new line was built over a different route between Redondo and Los Angeles, and both routes were electrically equipped; a total of 35 miles worked. In 1903 a third wharf was added to the coast terminals at Redondo. With the added facilities for getting business and a trade that the steam service had been developing for years, it became necessary not only to give better passenger facilities, but to meet the increased demands as a freight carrier, and the company has found the use of electricity extremely satisfactory to accomplish this.

Owing to the advantage of a comparison of active operation under steam and electricity in a service handling both passengers and freight, the experience of the company has been such that it can compare with unusual accuracy the comparative merits of electricity and steam in handling car-load freight for moderate distances. The electric motor cars with a train of four or five loaded trailers make the 17-mile run between Redondo and the freight depots in Los Angeles in about 50 min. The power consumed with this load costs about $1.80 on the average, as against a corresponding outlay of $2 for fuel in running a steam locomotive with the same load. Another important advantage as against steam is that the electric freight trains require a crew of only two men, instead of four, as previously. The repair account thus far has also been less than 10 per cent. of the locomotive repair account when the road was operated by steam.

Three regular return trips are made daily by a freight motor car to handle the local freight traffic, and such additional runs as are necessary are made to handle the through freight. The freight rates that had been in effect before the road was converted to electricity have been adhered to, and while there is thus no advantage to the general public in favoring electric freight carriers as against the steam service, the management feels that the unquestioned advantage from a passenger-carrying standpoint should justify the conversion of all suburban roads. The electric carriers are at no disadvantage so far as their service to the public is concerned and are distinctly gainers from the operative standpoint. Before its conversion to electricity the Los Angeles & Redondo handled less than one-third of the passenger traffic between the terminals named. Since its conversion the travel between Redondo and Los Angeles has practically doubled and more than 90 per cent. of it is handled by the electric line. Practically all of the new route covered by the company is on private right of way and the road is substantially built, so that fast time can be made by the passenger cars. All the company's motor cars engaged either in freight or in passenger business are equipped with individual watt-meters, so that a record is kept of each motorman and of the individual car consumption under varying loads and conditions. This is a departure



Freight Train Hauled by Electricity; Los Angeles & Redondo.

from usual practice, but the management feels it is abundantly justified by the check it gives on power consumption and on the efficiency of service rendered by the motormen.

Electric hoists have recently been installed on wharf No. 3 and the practical tests as against steam hoists that have been in use on the other roads show almost as marked an advantage as the comparison between electric and steam locomotives. It is the purpose of the company to use electric hoists throughout all its wharves. All the cars, both passenger and freight, have been built in the company's own shops at Redondo.

For the illustrations and for the information courteously furnished we are indebted to Mr. H. B. Ainsworth, Secretary.

The Corrington Alternate Quick-Acting Brake System.

A solution of the difficulties attending the operation of long trains with powerful locomotives due to the combined action of the ordinary quick-acting air-brake and the recoil of the draft gear, which causes the frequent break-in-twos, seems to have been found in the combination of the automatic air-brake and a straight-air equipment on the locomotive and tender. The Westinghouse Air-Brake Company, some years ago, devised a combination of the two systems of air-brakes, known as Schedules S-W-A and S-W-B, which has been applied, to some extent, on the Canadian Pacific, the Colorado Midland, the Soo Line, the Northern Pacific and a number of other roads with retaining valves assists materially in handling long trains without break-in-twos or runaways. On most mountain roads, however, extra precautions are taken to see that all of the brakes are in good working order and all the retainers set up before descending long grades, and the brakemen are usually on top of the cars with clubs to set the hand-brakes in case of an emergency. With these precautions, less trouble is experienced, perhaps, than on comparatively level roads handling exceptionally long trains where frequent stops and slow-downs must be made. Unless the engineer is very skilful, break-in-twos are sure to result at water stations and similar places where the brakes are set too hard to carry the train up to the exact stopping point desired. Part of the release is made when running at reduced speed. In switching service, it is almost impossible to handle a cut of cars with much speed with the quick-action brake alone without shock and damage to the cars and lading. The triple valve will not recharge the auxiliary reservoir between very frequent brake applications, and as a result, the engineer is compelled to make stops with the reverse lever. A quick release is possible with straight air, and if desired, the brakes can be only partially released.

The Westinghouse combined apparatus for an engine and tender requires, besides the usual quick-action automatic apparatus, a connection from the main reservoir to a ¾-in. straight-air brake valve through a slide valve feed valve and an additional system of piping from the straight air brake valve into the brake cylinders on the engine and tender, requiring an additional 36-in. hose under direction of the engineer. The valve is designed to be applied in the present location of the brake valve, where it is isolated from injury, dirt and freezing. All of the apparatus, except the auxiliary reservoirs and brake cylinders, are removed from underneath the engine and tender. The only difference between freight or switching engine and tender equipment and passenger equipment, with the high speed brake would be the addition of the truck brake cylinder, auxiliary reservoir, and flexible connection. The reversing cock and two high speed reducing valves, in addition to the other apparatus, would be displaced.

The brake valve portion of the consolidated engineer's valve and approved existing types are very similar, with the exception that an additional feed valve and running position of the handle is provided. This permits the use of two train line pressures and allows the use of either, according to the position of the operating handle, making unnecessary the use of the present reversing cock, two feed valves and pipe bracket. The advantage of having two feed valves set at the same pressure in freight service, and in connection with long trains, as compared with one, as at present, is obvious.

The positions and directions of movement of handle for full release, running, service, lap or emergency, with the exception of the position for the extra feed valve mentioned, are the same as in valves of the Westinghouse type. The method of operating the equalizing piston with train line air also differs from, but is equal in efficiency and time to, existing types. Owing to the design of the port leading to the under side of this piston, as shown

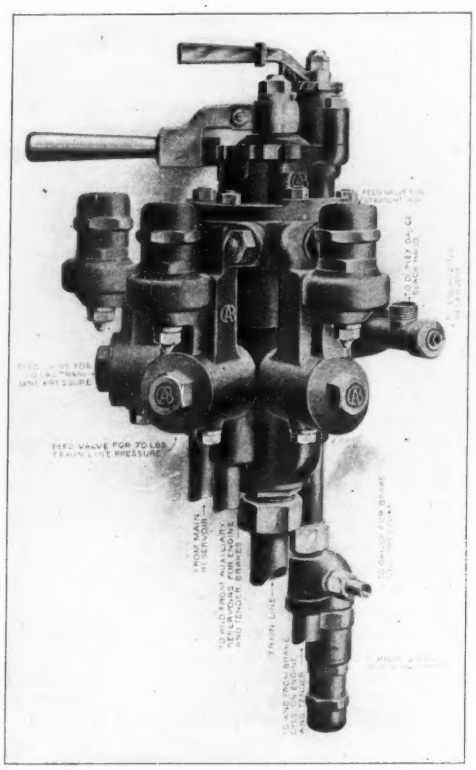


Fig. 1.—Consolidated Engineer's Valve.

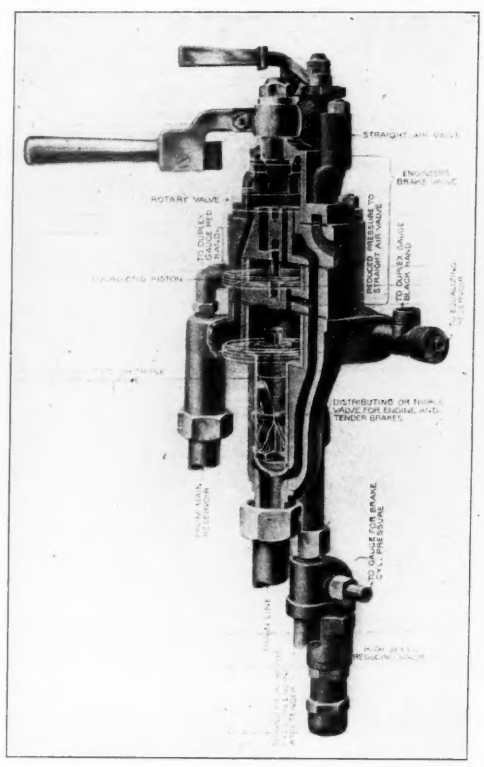


Fig. 2.—Section of Brake Valve in Release Position.

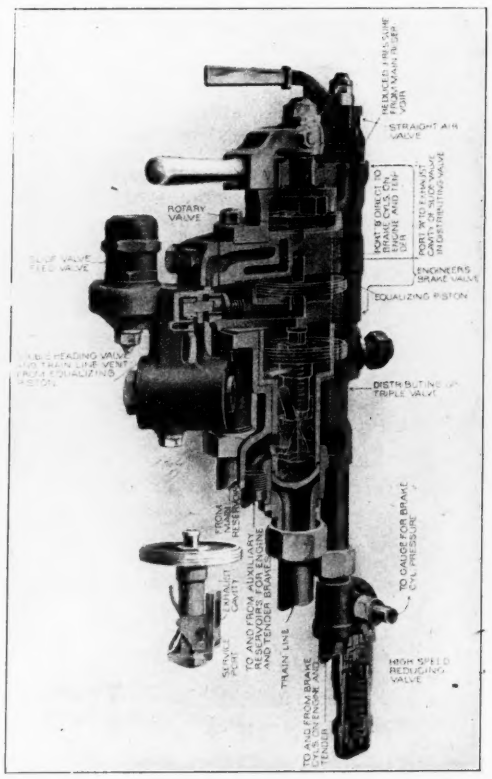


Fig. 3.—Section of Brake Valve in Service Position.

marked success. Last year a committee of the Car Foremen's Association reported on the causes of trains parting, and one of the principal causes was attributed to the release of brakes at slow speed without proper resistance on the engine or on the head end cars. It was recommended at the time that all engines in road service be equipped with straight air in addition to the automatic quick-action air-brake, or, if this does not meet with entire approval, that trainmen be required, where slow-downs are made and where the speed is not to exceed eight miles per hour, to bring the train to a full stop, or set up about six retaining valves on the head of the train, or set at least from four to six hand-brakes. The application of straight air to the locomotive is recommended as the preferable method of overcoming break-in-twos from this cause, as conditions will sometimes arise when the attention of the head brakeman will be required at some other part of the train than on the head cars when the release of the train-brakes will be necessary. The engineer, being permanently located in the right side of the cab while handling the engine, can more readily, with one movement of the hand, apply the brakes than the trainman can turn up the retainers or set up a few hand-brakes. A paper which was read at the Traveling Engineers' Association meeting last September gives the gist of the replies to a circular of inquiry sent out to all the roads using the combined straight air and automatic brake. All of the roads answered unqualifiedly that they found many advantages in its use and no disadvantages, and that the cost of maintenance over the automatic brake, covering a period of from six to eighteen months, had been practically nothing.

On trains running over mountain divisions or on lines in which there are frequent humps and sags, the use of between the engine and tender. Double check valves and a safety valve set at 53 lbs. are inserted in the piping system to prevent the action of the straight air when the automatic is applied, and vice versa, and to guard against an excess of pressure in the brake cylinder over and above the limit to which the safety valve is set. The straight-air brake valve is mounted in the cab near the automatic brake valve, within easy reach of the engineer. The following description of the Corrington alternate quick-acting brake system, which is embodied in a consolidated engineer's valve, explains the action of the system of operating air-brakes on the train devised by the Corrington Air-Brake Co., and which accomplishes all the functions of the combined Westinghouse apparatus.

In the accompanying engravings, Figs. 1 to 5 show the construction of the consolidated engineer's brake valve which is the essential piece of apparatus in this system. It combines in one piece of mechanism the triple valves for the driver and tender brakes, the high-speed reducing valve, the brake valve for operating automatic brakes on all the cars in the train, the feed valve and reversing cock, and all of the straight-air equipment applied separately in the Westinghouse apparatus including the operating valve, double check valves and feed valve. These parts are all combined in such relationship to each other that each system is, at all times, independent of the other, and they are so designed that they can be operated together or separately. While operating one, the other may be brought into use at the same time without interfering with any of the automatic features. When used in connection with the usual quick-acting brake system applied to the cars, both an intermittent and an alternate continuous system is obtained, and the full control of the train is concentrated on the engine in Fig. 2, it will not open after an emergency application or a heavy train line reduction when the handle of the brake valve is moved to full release position. By a special arrangement of ports the train line pressure is indicated by the black hand on the duplex gage when the handle of the brake valve is on lap position. Except for the adjustments of design to suit the triple valve portion of the consolidated engineer's valve, the main reservoir air has access to, and the train line air to and from the brake valve in the usual manner.

For convenience in double-heading, and in order that the automatic features of the brake may be maintained on the second engine, a small rotary valve is provided at the termination of the outlet of the train line from the equalizing piston. When double-heading it is only necessary to close this valve and place the handle of the brake valve on lap, leaving the triple portion of the consolidated engineer's valve operative from the first engine, the same as though the second engine and tender were a car and formed a portion of the train.

While the sequence of operation is similar to other types of brake valves, the time required for release and recharge, with the handle in full release position, has been very materially reduced, owing to design and arrangement of ports and passages. The same is true in the running position owing to the size and arrangement of ports and the construction of the slide valve feed valve.

The Corrington type of slide valve is interchangeable with, and similar to, existing types in its moving parts and their operation. It has some advantages, however, owing to the arrangement of these parts with reference to each other. By reference to Fig. 5 it will be seen that the sensitive or diaphragm portion A, is so located, with reference to the non-sensitive or slide valve and

piston portion B, that the oil and dirt, which to a greater or less extent accumulates in these valves, can only reach the diaphragm portion from the train line ports E and F and the piston chamber, after having first passed through the port D leading to the pocket C below the piston or non-sensitive portion. This arrangement eliminates the usual difficulty experienced with the small valve operated by the diaphragm, when it is clogged up with dirt or grease. A plug C is provided for this pocket so that the accumulation of dirt and grease can be periodically blown out.

The triple valve portion of the consolidated engineer's valve is the same in principle as the plain triples now in use. It is operated by a reduction or increase in train line pressure through the port and passages connecting with the cylinder and train line as shown in Fig. 2. The size of the ports in the slide valve, and in the slide valve bushing, are such as to accommodate in one valve the full volume of air required by the brake cylinders on engine and tender, and the results are equal to those obtained by the two triples as used at present.

The piston, slide valve, and graduating valve, as shown in detail in Fig. 3, perform the usual functions, admitting air to the brake cylinders on the engine and tender in the position indicated in Fig. 4, and exhausting the brake cylinder pressure to the atmosphere through the cavity in the slide valve, the port A and the straight air valve when in release or normal position, as shown in Fig. 2. The feed groove for recharging is of sufficient capacity, to recharge the auxiliary reservoirs for the engine and tender brake cylinders within the proper time, but not sufficiently large to cause a rapid rush of air and a reapplication of the brakes on the engine and tender. For compactness the graduating stem and spring for use in emergency application is included in the triple piston.

The main reservoir, train line, equalizing reservoir and gage connections, as well as all other pipe connections, are made directly to the triple valve body for convenience of cleaning and making repairs, making it unnecessary to break any pipe connection for the removal of any portion of the engineer's valve. The dimensions from the stud to any of these unions or connections are the same in all respects as the present Westinghouse type of brake valve. Two ¾-in. pipe connections are made to the triple valve, one leading to the auxiliary reservoirs on the engine, and the other to the brake cylinders on engine and tender. The latter contains a special fitting for the automatic high speed valve and a gage connection for the brake cylinder pressures.

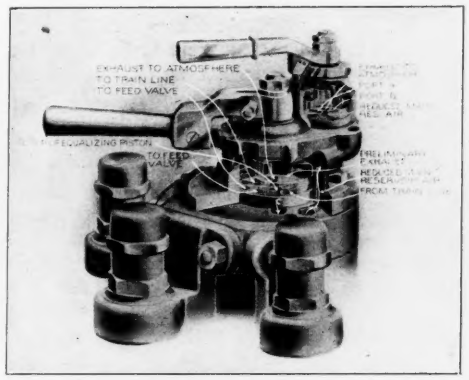


Fig. 4.—Section of Automatic and Straight Air Brake Valves.

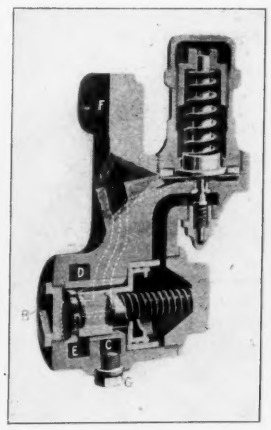


Fig. 5.—Slide Valve Feed Valve.

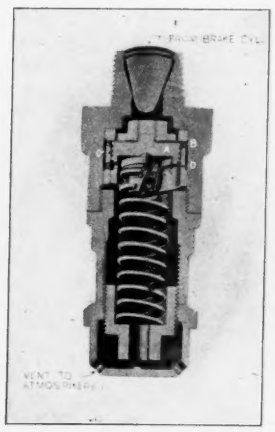


Fig. 6.—High-Speed Reducing Valve.

The straight air portion of the consolidated engineer's valve constructively forms a part of the cap, enclosing the rotary valve of the brake valve. It consists of a small rotary valve and key which is enclosed or covered by a separate cap held in place by two studs. This cap is provided with an index plate containing notches indicating the release, normal, lap and service positions of the operating handle, the relative location of this handle to the brake valve handle being such as to afford easy and prompt operation of either by the engineer with one hand without interference. The handle of this valve is made square and it is also reduced in size as compared with the brake valve handle so that the engineer can tell by touch which handle is being used.

In Fig. 4 the openings constituting port A, port B and the exhaust to the atmosphere, are shown in the seat of the straight air rotary valve, the port A being the termination of the exhaust port from the triple valve, and the port B, the termination of a direct connection to the brake cylinders and service port of the triple valve, as indicated in Fig. 3, in full section. The additional ports shown in Fig. 4, connecting with the cavity in the seat, and not specially indicated, are provided for the purpose of securing additional area of opening and to avoid excessive movement of valve. A fourth, or reduced main reservoir air port is provided, being the termination of the reduced main reservoir air passage leading from the special slide valve feed valve, to which main reservoir pressure is supplied from the cap enclosing the rotary valve of the brake valve and through the port C, as indicated.

In the release position of the straight air valve, ports A and B are both open to the atmosphere. In normal position the port A and the exhaust port of the triple are open to the atmosphere. In lap position all ports are closed. In service position the reduced main reservoir pressure is admitted into B leading to the brake cylinders. In release position of the handle a warning or alarm port is also opened as a suggestion for returning the valve to normal position. The normal or release position of the handle of the straight air valve corresponds to a running position, and in this position provides a continuous and free outlet to the atmosphere of port A from the exhaust cavity of the slide valve and the port of the triple.

Rapid transmission of air to, and exhaust from the brake cylinders, when straight air is used for switching service, has been provided for by increasing the areas of ports A and B, both of which form a continuous passage from the brake cylinders when the automatic valve is not in use.

The automatic high speed reducing valve used in connection with the engineer's valve is shown in Fig. 6. All of the functions are performed by a floating piston A, which does not fit the cylinder sufficiently tight to produce a serious friction or require lubrication. Three rows of small holes D, of the same size, but varying in number, are provided in the bushing of the cylinder, and these holes govern the escape of air. During the time of highest pressure, the piston A is at its limit of travel. The air passes under the piston A and through holes B, into cavity C, and thence through the one row of small holes open at this time, through the holes in the piston, and thence to the atmosphere through openings in cap. In the movement to close, the three rows of holes are opened in succession, the full number being open just before the closing of the valve or piston. The number of holes are increased to suit the capacity of the cylinders on the engine and tender, and in a similar manner, proper outlet is provided to suit various sizes of cylinders on passenger equipment.

The relationship of the straight-air valve portion to the brake valve and triple valve or automatic portion is such that the brakes on the engine and the train can be applied or released in the usual manner. A sudden reduction of train line pressure as a result of train parting, hose bursting, or other similar causes will immediately cause automatic application of the brakes on the engine and cars in the usual way, and without in any way affecting or being influenced by the straight-air feature of the device. If for any reason, however, it is desired to retain the brakes on the engine and tender, and release on the train for the purpose of recharging, at the same time retaining control of the train, the movement of the straight-air valve handle to lap position, before releasing with the brake valve in the usual way, will close the port A to the atmosphere, preventing the escape of air from the brake cylinders on the engine and tender, and allow the triple piston of the consolidated engineer's valve, as well as those on the cars, to move to release position and recharge the auxiliary reservoirs on engine and cars. An increase of pressure in the brake cylinders on the engine and tender can be secured, up to the full limit for which the straight-air feed valve is set, by moving the straight-air valve handle to service position, bringing the port B, leading directly to the brake cylinders, as shown in Fig. 3, into register, and permitting the reduced main reservoir pressure to flow directly to the brake cylinders. This pressure can be released or partially reduced by movement of the straight-air valve handle to release position.

Having applied the brakes automatically on the engine and tender and throughout the train, they can be released on the engine and tender by moving the straight-air valve handle to full release position. They can be reapplied and the pressure increased or reduced or again released entirely by a repetition of the movement described. Similar movements of the straight-air valve handle make it possible to increase or decrease the pressure in the brake cylinders on the engine and tender during the time the automatic brakes are being applied, and even before the equalizing piston closes.

The combination of the automatic and straight-air systems, when used with present car equipment, makes possible an alternate-continuons performance of braking, alternate because either the automatic or straight air can be used, and the train controlled during the period of recharging by the engine brakes, or brakes retained on the train during time of release on engine; and continuous because the engine and train are at no time without brake control. The engineer has entire control of the train at all times.

The brakes on the engine and train can be applied and released in the usual way, using the automatic, or the brakes on the engine and throughout the train can be applied, using the automatic, and with straight-air increase, the brake power on the engine during the time the brakes are applied on the train can be diminished or released entirely without affecting the brakes on the cars. The brakes throughout the train can be applied in the usual manner, without applying them on the engine and tender, and then applied on the engine and tender to any desired pressure without in any manner affecting the brakes on the cars. They can then be released on the cars without releasing on the engine. The brakes on the engine can be applied with straight air and, without releasing on the engine, applied on the cars in the usual manner, using the automatic. They can then be released on engine and cars in the usual manner, or released on engine alone without affecting the cars. The brakes can be applied on the engine and cars in the usual manner, using the automatic, and released on the train, retaining those on the engine, with any pressure up to the maximum permitted, and during the time the auxiliary reservoirs on cars and on engine are recharging. They can be reapplied on the cars without releasing on the engine, and when applied on the cars the engine brakes can be released without affecting the cars. In double-heading, the engineer on the second engine can release and reapply the brakes on his engine as often as may be desired by means of the straight-air valve, without affecting the brakes on the cars or the first engine. This prevents loose tires. He is also in a position to render assistance in control of train should anything go wrong on first engine. In case the train parts or the train line breaks, the engineer can at once assume as full control of brakes on the engine as though no accident had occurred. By operating the brakes alternately between engine and cars, releasing on one while applying on the other, and vice versa, overheating and loosening engine tires is avoided. The engineer knows exactly, and can vary at will, the pressure holding the engine brakes and can prevent their accidental release or leaking off. Under all circumstances the automatic features are retained on engine and cars, and their full value available in case of accident to the train line.

In the design and construction of the consolidated engineer's valve special attention has been given to wear, accessibility and renewal of parts. All index plates and nuts are case hardened, and the special composition used in valves and seats insures long wear and minimum friction. All surfaces liable to rust or corrosion are brass lined, and special provision has been made for lubrication. All the apparatus furnished is interchangeable.

The Corrington alternate quick acting brake system includes, in addition to the consolidated engineer's valve, all that constitutes the complete engine and car equipment required by railroads. It is interchangeable with existing standards, with two exceptions, namely, the automatic high speed reducing valve and the method of venting the train line to the atmosphere in emergency applications. The automatic high speed reducing valve, Fig. 10, is identical in action with the Westinghouse type, though different in construction. It is of small size and screws directly into the brake cylinder. The method of venting train line air to atmosphere in emergency consists of a piston and check valve inserted in check valve case in place of the usual check valve, a bushing in the bottom of the check valve case opening to the atmosphere, and forming a seat for the small check valve, which is connected to and actuated by the piston. All other portions of the triple valve are identical with the Westinghouse type.

Foreign Railroad Notes.

It is announced that the railroad to the Zambesi River, South Africa, will be completed this month, and it is expected that before the first of May a train will be run through from Cape Town to Victoria Falls. Work is in active progress on the bridge across the Zambesi at Victoria Falls. This point is about 250 miles northwest of Buluwayo, and Buluwayo is 1,362 miles from Cape Town. The London papers print this information under the head of news about the "Cape to Cairo" railway, though the whole length of the line from Cape Town to Victoria Falls equals scarcely more than a fourth of the estimated distance through to the Mediterranean Sea, and any suggestion that may be given by this title that there is any prospect of the construction, within the next 25 years, of a north-and-south railroad through the wilds of Central Africa is as shadowy as it was the day that Cecil Rhodes first uttered it. It is said that bids are being asked for the construction of 350 miles of railroad northeast from Victoria Falls in the direction of Lake Tanganyika.

The railroads in Finland are not what can be called improving properties, from a financial point of view. Beginning with 1899, their net earnings have been in successive years 3.31, 2.85, 1.81 and 1.40 per cent. of their cost, which in 1902 was about $55,000,000 for 1,705 miles.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The comparison of steam and electric working on the Los Angeles & Redondo, which is given elsewhere in this issue, shows economies in this use of electricity. The road is only 17 miles long, but nevertheless, the electric locomotives, hauling the four and five car freight trains, have reduced the cost of power about 10 per cent. The records show that the repair account, so far, is less than 10 per cent. of the locomotive repair account when the road was operated by steam. This remarkable reduction in repair costs may be due to the new equipment, but it is reasonable to expect that the simplicity of the electric locomotive will make for low maintenance charges. The elimination of boiler repairs alone results in important savings. Since electrification, the passenger traffic has almost doubled, as is so often the case, and it is assumed to be due to the more frequent service made possible. When people can take a train without consulting a time card, travel becomes a pleasure instead of a burdensome necessity, the result being that the road profits, not so much by reducing the cost of transportation as by creating a demand for additional transportation.

On the Southern Pacific in February two per cent. of the enginemen who were subjected to "surprise tests" were detected in more or less dangerous acts or neglect which were countrary to plain rules. These rules were, no doubt, well understood by the disobedient enginemen, and their conduct, as described in another column, may be characterized by the familiar phrase, "using their own judgment." At this distance it is impossible to say that any one of the ten delinquents actually ran into danger, and we have no doubt that each excuse, when rehearsed and amplified at the conferences around the round-house stove—if a round-house stove can be imagined in sunny California and Texas—was unanimously voted to be a full justification of what the engineman had done. Yet such little things as these figure in great collisions. Many collisions—probably a majority—are the result of neglect on the part of two, three or more persons, and it is often found that fidelity of one man, in a little thing, would have prevented disastrous consequences from the failure of another in a larger thing. Being held to strict account in these minor requirements is an excellent means of cultivating accurate habits in larger things, and the discipline should therefore be welcomed by those to whom it applies. Discipline is essential to correct habit. Why are runners more careful on busy lines close to cities than on remote branches? Not simply because there are more trains, but largely because the surroundings and circumstances tend to compel the formation of the habit of doing the right thing at the right time. We have daily drill in the army when actual fighting may not occur for 20 years; and fire drill in shops for the possible saving of a few thousand dollars in the indefinite future; yet we neglect a simple means of habit-forming in the serious business of protecting passengers' lives. Comparing with the railroads of the country as a whole this 98 per cent. of satisfactory conduct is doubtless a good record, for very few roads have made surprise tests so long or so methodically as the Southern Pacific. But a comparative showing will not satisfy the superintendents who are responsible for these men's service, for two per cent. represents a large number of derelictions. If every engineman in the whole force had been surprised on the same day the number of failures would have been so large that this two per cent. would have made a striking exhibit. But who else will come forward and show a record in similar service anywhere near as good as the Southern Pacific's?

The general inspector of the Southern Pacific, whose appointment is now announced, has a wide field, in most of which he can be, of course, only an observer. His function must be largely that of a supervisor of or adviser to other men who keep in active touch with the work. To do even this he will require for the 9,000 miles many lieutenants. For one man to attempt to cover that amount of territory would be like watering rose bushes with a teaspoon. The general idea is indeed commendable, and, as our readers know, the need of inspection has been often preached in these columns. There is one valuable service, however, that even a single inspector can accomplish on the largest road; he can keep the division superintendents in line. If he is not only sharp to see faults but also ingenious in finding the best ways to cure them; if he has one first-class division superintendent and if the others are ready and want to learn from that one, the inspector can do great things; for he can guide the superintendents in the duty of infusing into the ordinary employees a good degree of the knowledge and skill and energy of those who are above the ordinary—provided the company stimulates the attention of those whom it is desired to teach. Premiums and an annual or semi-annual recorded detail inspection may be as useful in this work as in maintenance of roadway, if the highest excellence is to be attained. Probably the need here is greater than in roadway, for the work of the conductor and the station agent, considered as an art, is not so clearly defined and so generally understood as is the art of making good track.

The Organization of the Wrecking Outfit.

There has been such progress, within the last few years, in the organization and perfection of outfits for clearing wrecks, that the *Railroad Gazette* has recently devoted some little space to the subject, with the view of conducting an experience meeting. The first wrecking organization described was that of the New York Central (Dec. 3, 1903) which no longer clears the line under exclusive orders from the track department; but there is a double organization, one consisting of large wrecking cranes and a full equipment of wrecking appliances, as enumerated, in direct charge of the Master Car Builder. These large wrecking outfits are located at important terminals and other central points. It is the duty of the foregoing organization to clear the road of all big wrecks. In addition, there is an auxiliary outfit in charge of each Track Supervisor, consisting of a small steam or hand derrick, jacks, blocks and falls, re-railing frogs and similar appliances, with which the minor wrecks are handled, where it is unnecessary to order out the stronger organization of the Car Department. At the time the change was made, a special effort was also made to polish up the organization until it resembled a city fire department, in the orderly manner and speed of response to calls.

The general scheme of the Pennsylvania organization, described March 11, is similar in that each central outfit is in direct charge of the car foreman, but wrecking is supervised by the motive power department. There is, however, a well defined difference of opinion as to the advisability of clearing wrecks under the supervision of men specially interested in the salvage of the rolling stock, for the reason that the vital thing, especially on a busy section, is to get the line open again, and the well being of a car or locomotive which is in difficulties should be a secondary consideration. A choked railroad is about the most useless tool in the world. The supervision of the car or motive power department may on this account be objectionable, and some railroad officers feel strongly that the track department, concerned solely in clearing the line, should be in charge. But on a branch line, where traffic is light, the salvage is occasionally the most important part of the job, and it is a distinct advantage to have the wrecking crew bossed by a trained car builder. There is also a difference of opinion as to the desirability of having the outfits centralized. A complete crew, with a 50-ton crane and tender, tool cars, etc., can be held always in readiness at terminals or at points where shops are located, but if these large outfits are the main dependence of the road, much time is lost in reaching small wrecks at intermediate points which should be cleared with a smaller, hand apparatus. The best practice tends toward a combination of the two types of equipment, with steam cranes so placed as to cover fifty or sixty miles of territory in each direction and take care of big wrecks, while smaller outfits operate in between, without a crane, but with picked men in charge of a foreman who has quick gumption to decide when to save, or when to roll down the bank, or when to burn.

The commissary of the wrecking outfit is of high importance; men can work a good while without sleep if they are supplied with plenty of good food and coffee. Certain supplies, especially canned goods, can be kept in the car which accompanies the train, but it is also possible to have the organization include a working agreement with nearby provision stores, so that a car can at once be supplied when a call is received. This is done by the Central Railroad of New Jersey, which notifies certain provision dealers by telephone when the wrecking train goes out, and provisions are quickly supplied. Whenever it happens that such arrangement has not been made, the officer on the spot has a chance, and it is his plain duty to take responsibility and get plenty of food and coffee for his men, especially at night. He must do this and run the risk of censure or approval. The Chicago & North Western makes its commissary car serve also as a hospital, and sends it out with the wrecking train, equipped with an operating table and a full line of hospital and surgical supplies. A list of these is given in our issue of March 11. The Pennsylvania does not send a hospital car with the train, but has one ready to follow if necessary, and special cars have recently been ordered for this purpose.

The previous articles have shown in some detail the special features of each of the outfits described. The Pennsylvania has designed a number of tools and handy devices, drawings of which were supplied at each wrecking station, in order that a stock may be kept constantly on hand. The New York Central emphasizes the necessity of orderly tool cars; each tool is numbered, and must be in its proper place as soon as it is laid down. Canvas is generally carried in the best organized outfits to protect perishable goods from rain, and one road amplifies this idea and takes along a dozen umbrellas for the use of passengers. The Lackawanna carries car sealers; also a telegraph table and instruments, climbers, and 500 feet of wire. Baskets, in which small articles can be handled, are also taken.

Apart from all these refinements, it is agreed that the first consideration is to get the line open and permit the resumption of traffic; the next thing to consider is the salvage of rolling stock and freight. As with other matters in railroading, each road and each wreck is a problem by itself, but the experience of general managers operating in widely different localities, under very different conditions, offers many useful suggestions.

"Not Proven."

The Interstate Commerce Commission, in an opinion by Commissioner Fifer, has announced its decision on salt rates from Michigan to Missouri River points and intermediate localities. Salt shipped from Manistee and Ludington to places on the Missouri River is carried by boat to Chicago, and by railroad from Chicago to its destination. The through rate is 53 cents a barrel, of which the boat line receives, according to the destination, from 30 to 33 1/3 per cent., amounting to from 16 to 18 cents a barrel. Established vessel lines on the lake formerly carried the salt to Chicago for from 8 to 11 cents, but additional services are rendered by the boat line, including stowage at points of shipment and unloading, cooperage, docking, storage, insurance, handling and loading in cars at Chicago, representing a cost of about 8½ cents a barrel. The boat line and the salt are owned by distinct corporations, but the same persons own controlling interests in both corporations. Salt interests at Detroit complained that this division to the boat line amounted to a rebate from the tariff to the salt shippers from Manistee and Ludington and enabled them to undersell Detroit salt in the Western markets. It further appeared that coal used in producing Detroit salt costs on the average about 75 cents to each ton of salt, while Manistee and Ludington salt producers also operate lumber mills and use the refuse from lumber manufacture for fuel in the salt works.

The Commission holds that it is no part of its duty

to equalize differences in the natural advantages of localities through the adjustment of tariff rates, and that upon the facts shown in this investigation "it does not appear that the share of the through rate allowed the boat line is so grossly disproportionate to the value of the entire through service as to amount to a rebate in favor of the salt interests of Manistee and Ludington, which also control the boat line."

To one who has followed the decisions of the Commission for a few years back, the query will occur whether the last half-dozen lines ought not to be embodied, in principle, in the decisions of nearly every rate question like this which comes before the Commission. The inference is that the Commission sees unfairness in the division between the boat and the railroad, but also sees that the unfairness is not clear enough to be mathematically proved. Without mathematical proof moral proof is of little value. The same situation often appears in the case of one-mile "industrial" railroads, to which the railroads enjoying the benefit of the long haul allow an exorbitant "switching charge," which really amounts to a rebate; and also in Pennsylvania, where the same companies own both coal mines and the railroads which serve the mines. The Interstate Commerce Commission began a dozen years ago to investigate the coal rates, but has failed to have anything decisive done about them, largely for the same reason that it is unable, as in this salt case, to marshal the evidence in such a way as to prove to the satisfaction of courts and legislatures that injustice has been done. The principal ground, to-day, for criticism of the Commission is that it has attempted to solve commercial questions that are too intricate to be solved on equitable grounds. The great majority of freight-rate questions have to be settled arbitrarily. From Congress or a Legislature the people will put up, more or less cheerfully, with arbitrary decisions; but they will not accept them from the Commission (or from any court except the highest). It is gratifying to see the Commissioners frankly set forth their inability to formulate and decide a question that defies formulation, but they would perhaps have done still better if they had told the complainants at the outset that they had no case—unless they care enough about it to sue in the courts for damage. In this branch of rate-making a very few decisions by the Commission ought to be sufficient to define the spirit of the law for a good many complainants.

The Mersey Electric Railway.

Information is now available respecting some of the advantages which have followed the conversion of the Mersey tunnel railway at Liverpool from steam to electricity. Electricity was adopted as the only possible means of solving the smoke problem, and of reducing the operating expenses, which had for years under the old conditions amounted to about 90 per cent. of the gross receipts. The data obtainable from the brief electrical experience show that whereas formerly the annual cost of ventilation was $24,000, it now costs only $2,000 per annum. The schedule speed for the steam trains was 15 miles per hour, but with electricity the 20-mile rate, for which the system was designed, is attained. The steam train mileage was less than 6,000 per week, but during the last quarter of 1903 the electric trains made nearly 15,000 miles per week. At this rate the total yearly mileage will be considerably in excess of what was anticipated by the engineers. The average coal consumption is working out at less than the 4 lbs. per k.w. hour at the switchboard, which was estimated. The consumption of energy for a loaded three-car train was estimated not to exceed 9.35 k.w. hours per train mile, and indeed for the last quarter of 1903 the actual figure obtained was less than 9 k.w. hours.

Turning next to the operation costs per train mile, it was not considered that for an average train 230 ft. long and weighing 105 tons, including motors, the cost would exceed 13.5 cents per train mile for power for operating and lighting trains, the maintenance of electrical equipments, cars and collector rails. Here again the estimate was well within the mark, for the figure for the last quarter of 1903 did not reach 13.5 cents. It will be of interest to compare this figure with the former steam conditions: The corresponding cost per steam train 200 ft. long and weighing 77 tons, exclusive of locomotive, but working at a schedule speed of 15 miles per hour instead of 20, exceeded 22 cents per train mile; it required an 80-ton locomotive to haul the 77-ton steam train. Mr. H. L. Kirker, who gave a full description of the Mersey system before the English Institution of Electrical Engineers on March 1, said that the total power station cost, made up of maintenance and operation (coal, water, oil, waste, sundries, labor), was working out at .7 cents per k.w. hour.

The steam plants, which once ineffectively dealt with the ventilation of the tunnels, have been displaced by two 12-ft. and one 5-ft. motor driven fans, the smaller one being at the low level station and the larger ones at two other stations. In normal operation each 12-ft. fan moves 65,000 cu. ft. of air per minute with a consumption of 24 h.p. It is said, however, that owing to the natural ventilation of the tunnel the 5-ft. fan is seldom needed. For the prevention of fire the driver's compartment of the car is lined with $^3/_{16}$ in. asbestos slate. All cables have non-combustible insulation; the motor leads are carried in iron tubing; the car bottom directly over the motors, rheostats and cables is lined with asbestos slate. In addition to the circuit breaker in the driver's compartment, there is a fuse on each shoe-beam. The power cables are confined exclusively to the motor cars. The control line for the electro-pneumatic control circuits connecting the front and rear motor cars is independent of the power circuit, and gets its current from a 14-volt storage battery. All trains are provided with fire extinguishers. The size of the tunnel (26 ft. wide x 19 ft. high), its natural ventilation, independent lighting, grounded negative rail, and the system of train despatching enable passengers to get out of a train and proceed to the stations on foot without danger.

A Citizens' Alliance Against Strikes and Boycotts.

Beloit, Wis., a city of 14,000 people, conservative, prosperous, "unorganized" from a union standpoint, had, for years, been busy attending to its own affairs, attracting industries which located within its corporate limits, watching the erection of numerous new buildings, and rapidly adding to its population. The State Statistical Bureau reported that in 1902 the wages in Beloit per capita were the highest paid in Wisconsin. No serious differences had ever marred the relations between employers and employees.

In June, 1901, there were but three labor unions in Beloit, with a membership of 200, but in the spring of 1903, George Mulberry, fifth vice-president of the International Association of Machinists, and James Hogan, a general organizer of the American Federation of Labor, visited this Arcadia with a result that in the early summer of 1903 there were 21 unions with a membership of over 2,000 persons; and the manufacturers received the usual demand for an increase of wages, a decrease of hours and the absolute exclusion of every non-union man. Strikes, lockouts and boycotts followed, with the usual results of intimidation, coercion, violence and assaults. It is quite unnecessary to describe them in detail; it was the usual thing.

About 20 of the business and professional men met and organized a temporary Employers' Association and invited Mr. Frederick W. Job, secretary of the Employers' Association of Chicago, whose office is in the Marquette Building, to come and speak to them and advise the best treatment for the intolerable situation. This resulted in the organization of a Citizens' Alliance consisting of all classes of citizens who were willing to range themselves on the side of law and order and including employers, professional men and non-union workingmen. This alliance quickly acquired more than a thousand members; it maintained an office and aided its members in every possible way. It formulated public sentiment and became a bulwark against anarchy. In opposition to it the American Federation of Labor's organizer, James Hogan, made appeals to the country generally for help. He said: "Unless the trade unionists of the country answer the appeal of the Beloit labor organizations for assistance, the latter will be crushed out of existence." Outside trade unions did respond generally, to this appeal; nevertheless James Hogan was right—the Beloit labor organizations were quickly put out of business. They lost something like 90 per cent. of their membership by December of last year and most of them have given up their charters.

The action of the employers has been distinctly honorable and creditable; only two of them made any reductions in wages since the fight began and ended and both of these are said to have been fully justifiable and acceptable to the men. The lesson of this incident is an extremely valuable one, but it is so obvious that it is quite unnecessary to mention it. Full details can be obtained from Mr. Job.

In connection with the ex-lake differential fight between Philadelphia, Baltimore and New York, in the course of which rates have been reduced to a ridiculous figure having little relation to the cost of moving the grain, it is rather amusing to note that during the month of February out of 1,424,522 bushels of wheat exported from the country New York exported 12,904 bushels, and the other Atlantic ports did not export any at all. It may be concluded, therefore, that the differential fight was not expensive to the railroads concerned. Wheat movement was very light from all the export points during February, but Galveston exported more than twice the amount sent from any other port to a total of 861,120 bushels. The exports from Puget Sound this February amounted to less than 40,000 bushels, whereas last year during February out of a total of 5,552,600 bushels of wheat exported, 1,177,983 bushels went out from Puget Sound. The export of corn during February, 1904, was also extremely light, amounting to 6,827,304 bushels, or about half of the total for the country in February, 1903. This year Baltimore led with 1,871,795 bushels. Philadelphia was second and New Orleans third, while New York and Galveston each had approximately 800,000 bushels, New York being slightly in the lead and thereby taking fourth place. Boston and Charleston came next with 515,546 bushels. Comparing the relative export business done by the ports for the eight months ending with February, it is seen that Galveston handled by a very large margin the bulk of the wheat traffic, her total being over 16½ million bushels, while New York had to be content with about 3½ millions. New Orleans came second with 6,439,824 bushels. For the same eight months, however, New York and Baltimore together handled over half the corn export business. The New York exports aggregated 11,992,101 bushels and the Baltimore exports 9,014,336 bushels. Philadelphia was third with 5¾ millions and the Galveston business was relatively unimportant, amounting to a little over 2,000,000 bushels.

NEW PUBLICATIONS.

Steam in Covered and Bare Pipes. By Charles P. Paulding, M. E. New York: D. Van Nostrand Company. 1904. Cloth; 102 pages. Price $2 net.

There should be some purpose in writing any new book on an engineering subject, either to present new and original research or to collect in convenient form for reference the result of research by others. Most of the works on thermodynamics, steam boilers and allied subjects treat more or less briefly on the radiation of heat from steam pipes and boiler shells and on the relative values of non-conducting pipe coverings; but in covering such a broad field as that of steam-boiler design, for instance, it is hardly possible to more than touch on the principles of transmission of heat through plates and the radiation to the atmosphere. From time to time within the last ten years series of tests have been made by different investigators to determine the efficiency of non-conducting coverings and in this book the author has collected the data of the most important of these tests and analyzed the results from a theoretical standpoint. While these tests have been elaborately and carefully made, the true value of the different materials under test has been obscured by the lack of uniformity in the method of testing and no laws governing the general subject have been deduced in any of the published reports. This book combines the practical results of tests made and corroborates by the theoretical analysis the accuracy of the data obtained.

As long ago as 1850 the great French physicist, Péclet, investigated with wonderful skill and patience the laws of the emission of heat from a surface maintained at constant temperature and the laws of conduction of heat through materials of low conductivity. His experiments, though on a small scale and conducted strictly along laboratory lines, were so cleverly planned and skillfully executed that the empirical laws deduced from them were remarkably correct. No translation of Péclet's work has been made before into English, but Mr. Paulding has with much skill translated the more important parts of the French physicist's remarkable treatise (Péclet, Traité de la Chaleur, Paris, 1860). This has been included in the latter chapters of the book. The chapter headings of the translation are: Emission and Transmission of Heat; Transmission of Heat Through Solid Bodies; Applications of the Formulæ, covering, among other things, the transmission of heat through cylindrical envelopes; Heat Lost by Walls During the Suspension of Heating; The Influence of the Variations of Exterior Temperature on the Quantity of Heat Transmitted Through Walls, and the Temporary Heating of a Room.

Automatic Signaling. By Ludwig Kohlfürst.*

Here is a volume of 372 large octavo pages by an engineer who for many years has been a special student of electric signaling and has made various contributions on the subject heretofore in the German technical press. In this volume he declares his aim to be to give an account of all the devices heretofore invented and existing in the field of automatic train-signaling, in such a way as to enable the reader to understand and judge them, including many things which experience has condemned, believing that in the present stage of the art it is useful to know the failures as well as the successes; while among the numerous devices which have not served their purpose there may be some features which will be useful in further improving this comparatively new art.

In dealing with American automatic block signals the author draws largely on Mr. Carter's paper before the International Railroad Congress in 1900.. The index gives titles of no less than 36 different designs of automatic block signals. Many of these are familiar to the older readers of the *Railroad Gazette*. Not even this large number, however, takes in all of the good, bad and indifferent inventions of the last 25 years, for we miss some schemes that once filled their inventors' breasts with great hopes.

The Truth About the Trusts. By John Moody. Octavo. 540 pages; buckram. Moody Publishing Co., 35 Nassau street, New York, and 79 Dearborn street, Chicago. Price $5.

The author has entered a new field with great thoroughness. His work takes up the whole scheme of the trusts of the present day, classified according to character and importance and illustrated with numerous diagrams to show the interconnection of interest and ownership. The first diagram, for example, shows what the author calls the Rockefeller-Morgan family tree, and divides off the chief interests of these dominating factors and the lesser interests dependent on them. What might be called the editorial portion of the book is subservient to the historical and analytical, but it is clear that the writer believes in the importance and usefulness of modern consolidation of capital. The statistics throughout are elaborate and carefully compiled and the work should be of great assistance to those desiring a clearer understanding of the influences and interests affecting modern organization and capitalization of large enterprises. The extent of the field covered is quite astonishing.

Safety Appliances and Accident Reports: Interstate Commerce Commission, Washington, D. C.

That portion of the annual report of the Commission issued last December which deals with these subjects is

*Die Selbsttätige Zugdeckung auf Strassen-, Leicht- und Vollbahnen. Von Ludwig Kohlfürst. Mit 222 in den Text gedruckten Abbildungen. Stuttgart: Verlag von Ferdinand Enke, 1903.

issued in pamphlet form in advance of the publication of the full annual report. Besides the matter which was noticed when the report came out (Dec. 25, 1903, page 921), the pamphlet contains the report of the chief inspector on the condition of the 220,000 freight cars examined by the Commission's inspectors during the year, and the draft of a bill to require the use of the block system, which was sent to Congress with the report.

TRADE CATALOGUES.

Diamond Machine Co., Providence, R. I., has issued a 1904 catalogue of Gorton disc grinders. The distinguishing feature of these machines is the substitution of steel discs covered with an abrasive substance in the place of emery wheels. The discs are accurately finished and emery or carborundum cloth or paper is cemented on them by means of a special press furnished with each machine. This method provides a true cutting surface for accurate work and as the discs run at the high speed of 1,800 r.p.m., they cut faster than a solid wheel, with no danger of bursting. Twenty-three machines of different sizes and construction, single and double head, belt and motor driven, are illustrated and briefly described.

The St. Louis Expanded Metal Fireproofing Co., St. Louis, Mo., issues a 90-page pamphlet devoted to corrugated steel bars as applied to steel-concrete construction. The principal object of the volume is to illustrate actual structures of steel-concrete construction using corrugated bars, those selected being typical of the large variety of buildings in which these bars have been, or are now being used. The book also contains a resume of the designing formulæ of the company, tables for proportioning flat floor slabs, T beams and flat-top culverts and a discussion of the shear in rectangular beams. The last pages show a series of engravings from photographs of full-size beam tests made at Rose Polytechnic Institute by Prof. Malverd A. Howe, each cut having below it a description of the beam tested.

Hammacher, Schlemmer & Co., New York, have recently published three catalogues. One of these contains in condensed form a complete list of the tools and supplies made by the company for shipping departments, janitors and for all kinds of trades. The other two are in the form of special catalogues, with tables of dimensions and prices of the different kinds of saws and planes made by the company. After May, 1904, the new offices of the company will be located at 13th street and 4th avenue, New York city.

The Chicago Pneumatic Tool Co. issues a pneumatic hoist catalogue of 34 pages. It illustrates and describes pneumatic geared hoists with and without trolleys, cylinder hoists and stationary pneumatic winding drums. There is a table of hoist data and a diagram of theoretical amounts of free air per foot of lift for maximum loads under various pressures with different sizes of hoists. Detail views of the motors are shown and in the back is a list and illustrations of all repair parts needed for motor hoists.

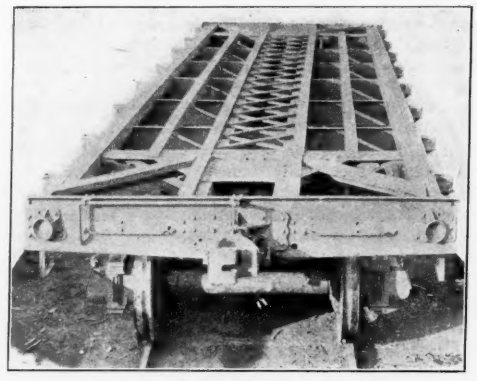
Graphite, for April, published by the Joseph Dixon Crucible Co., Jersey City, contains a leading article by W. H. Wakeman, on cleaning steam boilers, and one by John A. Walker, entitled "How is the American Business Boy to Get Along?" There are also the usual entertaining short paragraphs which combine business with pleasure.

Middletown Car Works, Middletown, Pa., makes a number of standard classes of cars for contractors and railroads which do not get up designs of their own. Three little folders recently issued contain illustrations and a brief synopsis of the specifications of a 30-ton box car, all wood, conforming to the dimensions adopted by the American Railway Association; a 30-ton, standard gage, wood frame flat car for railroad service or contractors' use, and a special 6-yard, two-way dump car, standard gage.

The American Track Supply Co., Chicago, has issued catalogue No. 1 on "Track Economy," devoted to Bailey surface and lining blocks used for surfacing and lining track. A description of the device and methods of using, with illustrations, are given. A number of testimonials from roadmasters who have used these blocks are included. The method of using the blocks in determining the amount of material needed for raising sags is also given.

Westinghouse Electric & Mfg. Co., Pittsburg, Pa., in circular No. 1077, dated March, 1904, describes type L, series wound, direct current motors which are suitable for hoisting or other intermittent work requiring a large starting torque. They are of the enclosed type, protected against the entrance of dust or dirt, and are adapted for service in mills, foundries and other manufacturing plants.

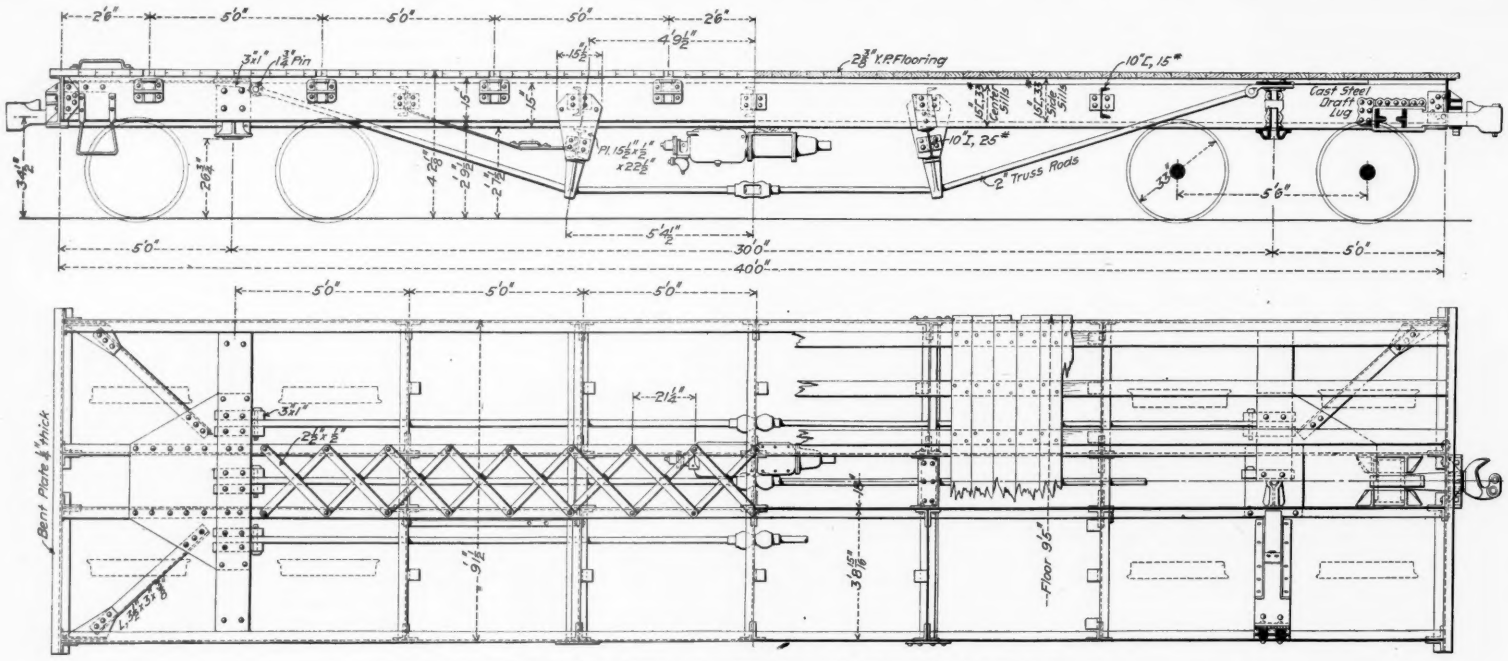
50-Ton Steel Underframe Flat Car Built by the Middletown Car Works.



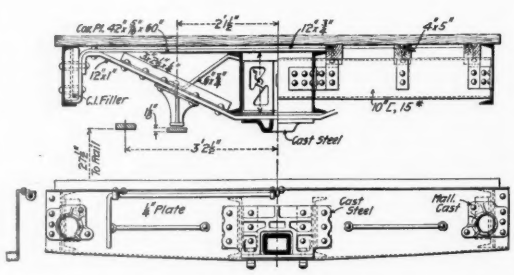
Skeleton Steel Underframe for 50-ton Flat Car.

Fifty-Ton Steel Underframe Flat Car.

The Middletown Car Works, Middletown, Pa., has recently built for the Standard Steel Works, Philadelphia, a 50-ton steel underframe flat car, 40 ft. long, which is shown in the accompanying engravings. With some slight modifications it is very similar in construction below the floor line to the 50-ton box cars built by the same company for the Illinois River Packet Company and which were described in the *Railroad Gazette*, Jan. 1, 1904. The underframe is trussed with three 2-in. rods instead of two as in the box cars, the third rod being placed under the center line of the car. The attachment to the top plate of the bolster is the same as that used in the box cars. This car is 9 ft. 5 in. wide over floor and 9 ft. 1½ in. over side sills, and in order to utilize the same forming tools for the bolsters as were used in the box cars, cast-iron filler blocks 3⅝ in. thick were riveted inside the side sills and the bolster plates were riveted on to them. The needle beams are 10-in., 25-lb., I-beams riveted under the sills to brackets and inclined away from the vertical sufficiently to take the upward thrust of the truss rods in line with the web. Plates cut to the shape of a keystone are riveted on the outside of the side sills over the ends of the needle beams to further stiffen them. The light weight is 37,840 lbs.



Plan and Side Elevation of Fifty-Ton Flat Car with Trussed Steel Underframe.



Cross-Section and End Elevation.

Truss rods under steel frame cars have not been used to any extent, in this country at least, probably because they are not altogether satisfactory under wooden cars. It is essential, of course, to have a stiff backbone to an underframe to transmit the stresses from end to end of the car in buffing, but it is not necessary to design the center sills as longitudinal columns to resist compression and as simple beams to carry all of the load as well. The combined stresses are impossible of calculation with any accuracy and oftentimes much heavier members are put into the frame than are needed. A properly secured and tightly drawn truss rod or truss rods assists materially in carrying the load and permits the use of a lighter section for the same strength or greater stiffness and strength for the same section, under a given load. In England and on the Continent truss rods are used on nearly all the steel underframe cars recently introduced. If the sills are formed in the shape of a fish-bellied girder or other section of uniform strength, truss rods are of little or no value, but there seems to be no reason why rational principles of truss design should not be applied to steel car frames as well as roofs and bridges when the members of the frame are of standard rolled sections.

We are indebted to Mr. Geo. I. King, Vice-President and General Manager of the Middletown Car Works, for the illustrations.

Railroading in the Philippines.

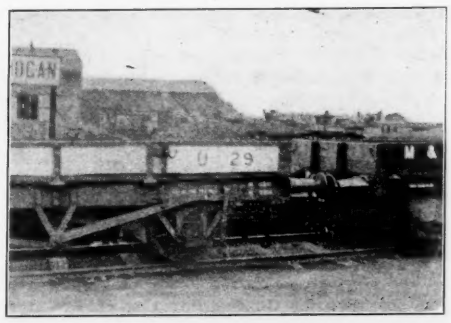
When a soldier gets his discharge from the army in Manila he commonly looks for work either on the police force, on the prison guard at Bilibid, on the fire department, or on the railroad. The superintendents of the police and of the railroad realize that in the soldier they get a man who is used to discipline and order—an uncommon quantity in the far east—and the Manila & Dagupan Railroad has opened some very good positions to ex-soldiers in office work, braking, station agencies, etc. The present management relies chiefly on native employees, but there is a very good sprinkling of Americans in the important positions. Undoubtedly the leading opening for American railroad men in the Philippines is in connection with the new railroads projected, which have been fully described in previous issues of the *Railroad Gazette*.

Everything connected with the Manila & Dagupan, and also with the little narrow-gage mine and plantation roads, bears the Spanish stamp, and car and locomotive designs, plans and surveying instruments are quite uniformly of Spanish origin. One reason for this is that even though the interested parties were American or English Spanish engineers have usually been engaged to supervise the work. They are easily obtained and have no difficulty in procuring all the native assistance that is needed. A Spanish engineer can assemble a motley crowd of natives in any town very quickly and get a day's work from them clearing land, cutting stakes, etc., in return for which the natives receive only a few cents each; but at the present time there is uniformly an American engineer at the head of each surveying and engineering party, whether it be engaged opening ways for lines on Luzon in the tobacco districts, or on Panay in the hemp, lumber and cocoanut sections. Many of these American engineers are young men newly graduated from technical institutions in the United States.

A description of the Manila & Dagupan Railroad as constituting the only present means of real rapid transit in the Philippines, was printed in the *Railroad Gazette*, Nov. 27, 1903. The accompanying photographs of an additional narrow gage tram road in the City of Manila, along the water frontage, are chiefly interesting, apart from their picturesque side, as showing the smallness of the gage and the general happy-go-lucky character of the line. The water front of Manila in its present state of development is a busy place. Lighters from the large vessels in the Bay arrive constantly with supplies of crated machinery, coal, army stores, furniture and general freight, much of which is handled by the steam tram line. The tram runs into yards and warehouses and is arranged conveniently for the distribution of incoming stores from the point where the lighters and scows land them at the stone wharf, while as to outgoing freight, there are constant shipments over the line of hemp and tobacco in bales, copra in sacks, cocoanuts, etc. The little road is always busy. It is amusing to watch the puffing, diminutive engine finding its way along the street through passenger and wagon traffic. The speed is slow, a man often walks in front, and no one seems to be in a hurry to get out of the way.

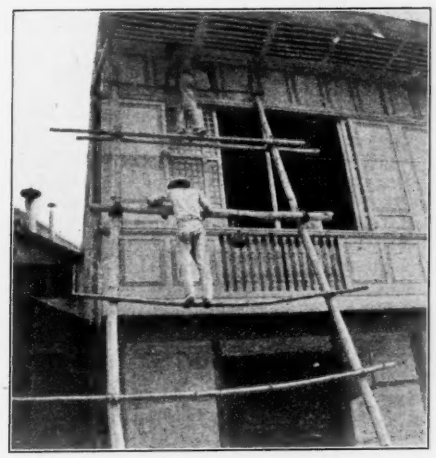
The engineers are Filipinos. The average Filipino is not over mechanical in his character and is rather inclined to botch a piece of work. It is customary, for example, to head up nuts on bolts to keep the nuts from working loose, without much calculation as to the time when it may be desirable to turn the nut off. The engineers of the steam tram road at Manila appear to be competent, however. They work along mechanical lines in the repair yard and apparently get a proper setting of cylinder and rod connections, etc. There are only a few brakemen, because the train always moves slowly and is constantly under good control of the engineer. The brakemen are all Filipino, while the trackmen are Filipino and Chinese. These native races can be hired at extremely low rates of wages. A Filipino engineer is quite satisfied with 60 cents a day, a fireman with 40 cents a day, a brakeman with somewhat less.

In addition to the regular personnel, the steam tram road has its corps of hangers-on, just as the Manila & Dagupan has. Philippine roads do not believe in wasting money on baggagemen and extra station hands. The passenger of the Manila road is supposed to be alert enough either to handle his own trunk or to hire one or more of the native loungers about the station to do the work in a hurry for him. In consequence, there is always a good supply of lounging natives and Chinese about the little freight road waiting for a chance to pick up five or ten cents for handling freight.



Cars Equipped With Spanish Bumpers.

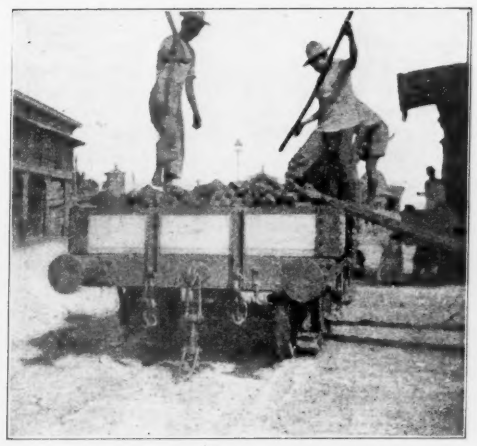
Temporary Camp of Lumbermen Cutting Ties.



Native Carpenters at Work on Depot in Manila.

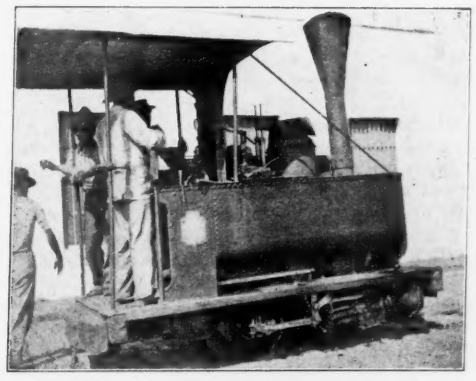
Native Employes for the Surveying Party.

View of Engine Cab, Manila Steam Tram.



Spanish Spring Bumpers.

Track Subject to Undulations.



Diminutive Locomotive and Filipino Crew.

Increase in Gulf Traffic.

The Bureau of Statistics of the Department of Commerce and Labor has recently presented a series of tables showing the comparative increases of import and export traffic at Atlantic and Gulf ports during the last ten years. The table of exports is particularly interesting and it will be seen that the total exports from the Gulf were more than two and one-half times as great in 1903 as they were ten years ago, while the total from the Atlantic ports increased only about 50 per cent., or at a rate of increase one-third as great as that for the Gulf. The actual volume of exports from the Atlantic ports continues to show a general tendency to rise steadily in spite of occasional fluctuations. The tables follow.

Value of exports from 20 principal ports of the United States in 1893 and in 1903.

Customs Districts.	1893.	1903.
Baltimore	$74,830,312	$84,347,278
Boston	83,530,264	86,429,988
Buffalo	3,826,743	21,667,866
Charleston, S. C.	11,056,287	3,468,986
Detroit	7,461,075	22,820,028
Galveston	35,957,550	144,355,883
Huron, Mich.	7,091,295	11,725,926
Mobile	3,301,031	15,146,504
New Orleans	85,215,773	149,671,926
Newport News	10,547,265	20,521,051
New York	357,997,688	516,148,264
Norfolk	10,689,522	8,686,785
Pensacola	3,737,384	15,822,589
Philadelphia	43,588,317	73,318,516
Portland, Me.	1,767,113	13,956,109
Puget Sound	4,809,096	27,450,507
Niagara	3,880,737	11,545,429
San Francisco	28,882,571	32,649,045
Savannah	23,535,847	58,565,372
Wilmington, N. C.	7,420,828	19,775,069

Value of imports into and exports from the Atlantic

and Gulf ports and the total from all ports of the United States during each calendar year from 1893-1903:

IMPORTS.

Calendar Years.	Atlantic Ports.	Gulf Ports.	Total.
1893	$642,017,157	$23,828,271	$776,248,924
1894	561,917,691	18,261,817	676,312,941
1895	666,525,645	18,240,986	801,669,347
1896	564,591,938	16,907,176	681,579,556
1897	616,303,353	17,756,220	742,595,229
1898	522,454,966	13,581,717	634,964,448
1899	654,472,800	20,073,280	798,967,410
1900	680,896,076	26,221,750	829,149,714
1901	707,303,987	29,824,241	880,419,910
1902	775,545,306	35,365,542	969,320,953
1903	788,609,803	39,027,740	995,447,175

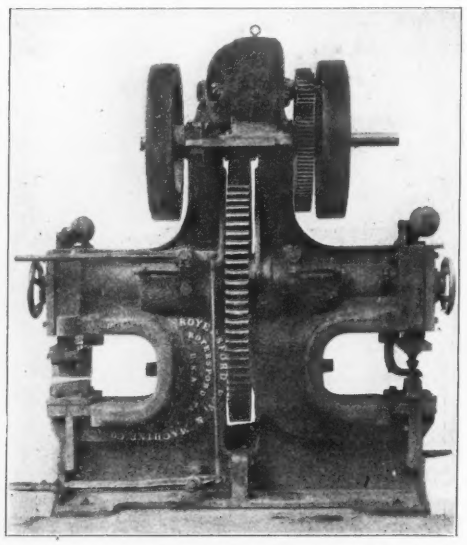
EXPORTS.

Calendar Years.	Atlantic Ports.	Gulf Ports.	Total.
1893	$642,798,894	$131,272,337	$876,108,781
1894	616,964,745	120,071,849	825,102,248
1895	596,244,559	120,300,517	824,860,136
1896	701,114,790	170,452,067	1,005,837,241
1897	772,210,869	181,028,211	1,099,700,045
1898	892,299,004	202,213,778	1,255,546,266
1899	896,532,699	203,368,668	1,275,467,971
1900	1,007,331,868	269,602,629	1,477,946,113
1901	967,306,139	286,423,623	1,465,375,860
1902	876,668,535	257,117,589	1,360,705,935
1903	919,901,648	331,596,006	1,484,681,995

A Combined Punch and Shear.

The double punch and shear shown herewith is compact and has the advantage of having the motor drive between the flywheels, without greatly increasing the distance between the wheels. The short length of the shaft and its large diameter tends to prevent springing under the torsional strain to which it is subjected at the instant of cutting.

The motor is a 5 h.-p. semi-enclosed type Crocker-Wheeler machine and is supported upon a small cast-iron



A Combined Punch and Shear.

bracket which is bolted to the bearing pedestals of the flywheel shaft. The bracket and the train gears between the motor and intermediate shaft were the only special parts required. Fortunately the proper speed of the flywheel shaft was obtainable with but one gear reduction, and as the pinion on the motor is of rawhide it is practically noiseless. The flywheels have been proportioned so that their inertia is sufficient to drive the punch or shear through the plate, thereby making the work of the motor more uniform and relieving the motor of damaging shocks and preventing sparking.

The main gear near the center has cast steel teeth and runs smoothly. Clutches having both hand and foot control may be used to connect or disconnect the main gear to either of the eccentric shafts that raise and lower the tool heads. Either side of the machine may thus be operated independently or both may be worked together. The eccentric shafts are steel and are of large diameter, and the eccentric boxes are phosphor bronze.

The machine has an 18-in. depth of thrust on both sides and the lower jaw pieces may be removed to facilitate punching I-beams and channels. On the shear side the machine is capable of cutting a length of 6 in. through a ¾-in. plate, or a 1¼-in. round bar, and on the punch side it is capable of punching 1-in. holes through ¾-in. iron. The Royersford Foundry & Machine Company, of Royersford, Pa., is the builder of this tool.

TECHNICAL.

Manufacturing and Business.

The Conoidal Union Valve Co., of New York, has been incorporated with a capital of $200,000. W. N. Barr, C. T. Willard and W. M. Palmer, of New York, are directors.

The Quintard Iron Works Co., of New York, has been incorporated with a capital of $250,000. The directors are N. F. Palmer, F. F. Palmer, of New York, and others.

The United States Engineering & Contracting Co., of Augusta, has been incorporated in Maine with a capital of $500,000. G. B. Hadlock and E. P. Whitton are incorporators.

The East Broad Top Railroad Company is in the market for a single head 60-in. wheel lathe, second-hand, also for a second-hand two-ton steam hammer for its shops at Orbisonia.

The Trans-Continental Refrigerator Car Company has been incorporated, in Massachusetts, with a capital stock of $1,000,000, to build and operate refrigerator cars and to own and operate cold storage plants.

The Hess-Bright Manufacturing Co., of Camden, has been incorporated in New Jersey with a capital of $250,000 to make ball bearings for axles. Fred E. Bright, H. Hess and J. F. Cutter are incorporators.

The Ramapo Foundry & Wheel Works, of New York, has been incorporated with a capital of $100,000, to make car wheels. The incorporators are J. Frederick Pierson, Ben. Barker and Lawrence E. Sexton.

F. W. Bird & Son, of East Walpole, Mass., are shipping over 4,000,000 sq. ft. of their Neponset insulating paper and 600 asphalt torsion proof car roofs to the American Car & Foundry Co., for the construction of refrigerator cars.

The Anti-Friction Journal-Box Co., of Los Angeles, Cal., has been incorporated with a capital stock of $1,000,000, to make a patented journal-box. The incorporators are Delos Allen and David E. Lyons, of Los Angeles, and others.

A petition has been made to the City Council by the Haskell & Barker Car Co., of Michigan City, Ind., for the vacation of part of a street which the company needs for a site on which to build an addition to its works. The proposed new mill is for making steel sills for cars.

The United States Malleable Iron Co., of Toledo, Ohio, is building additions to its works and is in the market for a large amount of machinery for which it will award a contract during May, to include one 20-in. stroke shaper, one 26-in. cross travel, one drill press, 20-in. swing, one milling machine for slotting metal patterns, one 36-in. hand saw, one metal shears, 12-in. cut, one 60 h.-p. engine and one 100 h.-p. boiler.

The Bullock Electric Manufacturing Company, Cincinnati, Ohio, has received an order from the Denver Gas & Electric Company, Denver, Colo., for one 1,500-k.w., 2,400-volt, three-phase, 100-r.p.m., 60-cycle, fly-wheel type generator. This machine is a duplicate of one sold this company about a year ago. The Denver Gas & Electric Company has also four 600-k.w., three-phase, 2,400-volt alternators, which makes a total of 6,000 k.w. in Bullock alternators installed.

B. M. Gardner, 541 The Rookery, Chicago, has been made sales agent in Chicago territory for the Pittsburg Steel Foundry. This foundry has five 20-ton furnaces and makes steel castings from 50 lbs. to 50 tons in size. Especial attention is given to steel rolls, castings for mills, electrical work of special mixture, binding machinery and railroad work. In addition, a general line of steel castings, and also heavy ingots in acid steel for forging purposes, are made. The capacity of the plant is 1,500 tons per month.

The American Bridge Company announces the removal of its general offices from Philadelphia to the Frick Building, Pittsburg, Pa., as follows: Mar. 26, President, Assistant President and Operating Manager; Mar. 31, Auditing Department, and Apr. 9, Treasury Department. The Eastern and the Pittsburg divisions of the American Bridge Co. have been abolished and the works at present embraced in them placed in charge of R. J. Davis as Operating Manager, with headquarters in the Frick Building, Pittsburg, Pa. The American Bridge Company of New York also announces removals to the same address as follows: Mar. 26, Chief Engineer; Mar. 31, Auditing Department, and Apr. 9, Treasury Department. The offices of the President and Secretary will remain at 120 Broadway, New York City.

Iron and Steel.

The annual meeting of the United States Steel Corporation will be held at the office of the Hudson Trust Company, in Hoboken, N. J., on April 18. There are eight directors to be elected for a three years' term.

The Pennsylvania Steel Co., Steelton, Pa., whose works were recently damaged by floods from the Susquehanna River, inflicting a loss of $50,000, has resumed work at its rail mill. Rollers are being built for handling rails from the drillers to the shipping yards.

It is reported that an advance in the prices of certain grades of Northern iron will soon be made. Some of the Lehigh Valley furnaces have already increased the price from 25c. to 50c. a ton, and it is expected that an advance of 50c. a ton will be uniform among many of the makers of pig iron.

The two new blast furnaces of the Carnegie Steel Company, at Donora, will be started to make pig iron April 5. Each furnace has a capacity of about 500 tons daily; this will add to the pig iron capacity of the corporation from 25,000 to 30,000 tons a month. The two furnaces were formerly owned by the Union Steel Co.

A report from Sharon, Pa., states that the output record at the Carnegie steel blast furnace was again broken Mar. 24. The furnace turned out 636 tons of pig iron in 24 hours, the best previous record being 603 tons. The management expects to make 19,000 tons of iron this month, which will equal the record of the Duquesne furnace. The capacity of the furnace is 550 tons.

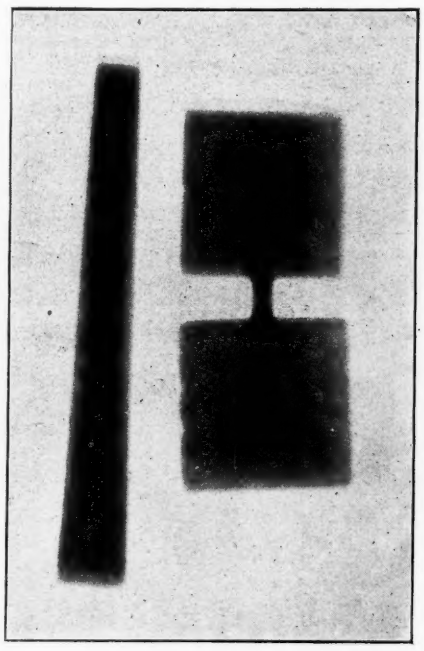
The Pacific Steel Company is the name of a company which has just been incorporated in California with a capital of $100,000,000, of which $50,000,000, in preferred stock, is said to have been subscribed. Gen. Harrison Gray Otis, of Los Angeles, is President; C. W. French, of Cleveland, Ohio, Vice-President; S. A. Dohuel, of Cleveland, Secretary, and George W. Fishburn, of San Diego, General Counsel. The Union Trust Company, of Pittsburg, Pa., is named as the company's Eastern agent.

Barrett Jacks for the Siberian Railway.

The Duff Manufacturing Co., Pittsburg, Pa., has received an order for a carload of Barrett track jacks for the Siberian Railway. This railroad and, in fact, nearly all the Russian railroads, has been using Barrett jacks for a number of years. The order is to be rushed forward at once as the jacks are urgently needed for the repairing of permanent track, and for the construction of new track. On the same day that the Duff Manufacturing Co. received the contract from Russia it received an inquiry for a rush order of Barrett jacks for the Japanese Railways.

Radiographs of Cast Iron and Steel.

Some interesting experiments with radium are described by Mr. A. E. Outerbridge, Jr., in the April number of the *Journal* of the Franklin Institute. In the half-tone illustration two pieces of the same cast-iron test bar were cut to the same thickness, viz., 1/16 in., one before and the other after expansion. These were laid upon a strip of lead (a metal which is almost impermeable to the emanations from radium) cut to a dumb-bell shape. A tube containing 100 milligrams of radium of 10,000 activity (by the Curie scale) was placed centrally by measurement, 4



in. above the pieces of cast iron. A wedge-shaped piece of steel of the same thickness was placed closed to the cast-iron pieces, for comparison, steel being less permeable to these emanations than cast iron. After an exposure of 38 hrs., the negative, which was placed beneath those objects, was developed and the print made therefrom. Several curious and interesting phenomena may be noticed. The rays passed through both pieces of cast iron and were intercepted by the lead strip making a distinct image of the lead strip underneath the cast iron. The central portion of the lead exposed to the rays between the two pieces of cast iron appears narrower than the portion seen through the cast iron, and looks more like a round rod than a flat strip. Also penumbra show around the edges of the cast iron and steel, indicating that the rays are in some degree deflected around the edges. The fact that such dense metals as iron and steel are permeable to emanations from radium may prove of practical value in detecting flaws.

The Sundry Civil Appropriation Bill.

The Sundry Civil Appropriation bill as reported to the House of Representatives on March 25 carries a total of $55,598,001 for the fiscal year ending June 30, 1905, or about $17,000,000 less than the estimates, and nearly $29,000,000 less than the appropriation for the current fiscal year. Among the larger new projects authorized is a heat, light and power plant to be located near the Capitol in Washington, to supply the Capitol, the Library of Congress, the new office building for members of the House of Representatives and any other Government buildings which may hereafter be located in that section of the city. The total cost of the new plant is not to exceed $757,000, of which $130,000 is appropriated by this bill. The appropriation for the Interstate Commerce Commission is increased from $325,000 to $340,000, the additional $15,000 being given to enable the Commission to keep informed in regard to compliance with the safety appliance act. An item of $400 is allowed to the Department of State for the participation of the United

States in the International Railway Congress, to be held in Washington, D. C., in May, 1905.

Heating Plant for the Olds Gasoline Engine Works.

The American Blower Company, Detroit, Mich., is installing its "A B C" fan system of heating in the new shops of the Olds Gasoline Engine Works, at Lansing, Mich. These shops are under one roof, the building being a one-story steel-frame structure, consisting of one division running east and west, 130 x 438 ft.; one division running north and south, 62 ft. x 346 ft.; a locker, office and washroom section, 36 ft. x 141 ft., and a paint storage room 20 ft. x 20 ft. The heating apparatus is designed to provide for an addition of 130 ft. x 438 ft. to the main part of the building and to maintain an average temperature of 65 degs. F. throughout, except in the offices and paint shop, which are to be heated to 70 degs. The apparatus consists of four units, each made up of an "A B C" sectional-base heater, having a capacity of 3,250 lineal feet of 1-in. pipe, to which is attached an "A B C" full-housed steel-plate fan. One of these fans is located in the 62-ft. wing and has a housing 100-in. high and a wheel 66 in. in diameter. The other three are regular 120-in. "A B C" fans, with wheels 72 in. in diameter. The fans are driven by independent motors. All of the air ducts are carried on girders above the bottom chords of the roof trusses in the wings.

Automatic Block Signals on Electric Railroads.

Westinghouse automatic block signals arranged for electric railroads (where one of the rails of the track is used for the return of the powerful propulsion current) are now in use, or soon to be installed, on the lines of four different companies, aggregating over 100 miles of track. These installations, as given in a pamphlet which has just been issued by the Westinghouse Brake Company, Limited, of London, are as follows: Boston Elevated, opened June, 1901, miles of track 17, number of signals 100; Ealing & Harrow (Metropolitan District), London, miles of track 10, number of signals 20; Metropolitan District, London, miles of track 30, number of signals 200 (apparatus now being made); North Shore Railway, San Francisco, opened October, 1903, miles of track 20, number of signals 54; Interborough Rapid Transit Company (subway), New York, miles of track (estimated) 30, now being installed by the Union Switch & Signal Company. The length of track in the New York Subway is our own estimate; the work thus far planned is for the express tracks only. Westinghouse signal work in England is done by the Westinghouse Brake Company, Limited.

THE SCRAP HEAP.

Notes.

Four hundred and fifty barrels of flour were recently shipped from Minneapolis in one car.

A bill has been favorably reported in the New York Legislature at Albany to increase the number of members in the State Railroad Commission from three to five, and to enlarge the powers of the Commission.

The Railroad Commission of Georgia has ordered proceedings in the courts against the Seaboard Air Line and the Hawkinsville & Florida Southern to recover fines of $5,000 each for disobedience of the Commission's order to provide station facilities at Pitts.

Chicago papers say that the Rock Island road has decided not to carry out its plan of absorbing cartage in Chicago to compensate for the unfavorable location of its freight houses; but the railroads are now worried over cartage allowances made by the Wisconsin Central.

Notice has been issued at Chicago to the effect that where sleeping car berths are reserved in advance they must be paid for a specified number of hours before the time of departure. One report has it that three prominent roads leading eastward from Chicago have declined to enforce at their offices this order of the Pullman Company.

On Monday, March 21, 121 freight trains, consisting of about 7,000 cars, were moved to and from Buffalo on the main line of the New York Central, special effort having been made on that day to move the large number of cars which had been delayed by the severe weather. The eastbound movement consisted of 69 trains of about 60 cars each.

The members of the Central Passenger Association, after granting reduced rates for passengers going to the Young Men's Christian Association Convention at Buffalo, next month, voted on March 25 to withdraw the concession. The cause of this action was the alleged favoritism shown to the Grand Trunk by the Secretary of the Chicago Y. M. C. A. in a circular which he issued.

The clause of the appropriation bill now before Congress providing for railroad mail transportation during the next fiscal year has been amended in the House by the addition of a requirement that no part of the appropriation shall be used for rental of mail cars which have been in service more than 15 years. The amount appropriated for special fast mail service between Washington and New Orleans is $142,728.75.

The Interborough Rapid Transit Company, operating the elevated railroads in New York City (on which are employed over 4,000 men) and which will operate the railroad in the subway throughout the length of Manhattan Island when that railroad is finished, is considering a plan for a relief department like that of the Pennsylvania Railroad, and has laid it before the employees for their consideration.

The New York Central is putting up a direct wire between New York and Chicago for telephone purposes. It is a No. 8 copper wire. West of Buffalo the line follows the Lake Shore & Michigan Southern. Its terminals will be the Grand Central station, New York, and the Lake Shore station, Chicago. The company is also preparing to have direct telegraph service by way of Syracuse to Watertown and Corning. Heretofore messages for Watertown were repeated at Syracuse, and Corning messages at Lyons.

The suit of the Interstate Commerce Commission to compel the Lake Shore & Michigan Southern to furnish certain statistics in its annual report has failed, in consequence of a decision of the Circuit Court, at Cleveland, dismissing the Commission's petition for want of jurisdiction. This appears to have been a test suit to establish the right of the Commission to get statistics of average receipts per mile on individual commodities, such as grain and coal. Suits are pending against other roads involving the same question.

Philadelphia papers announce that during the Louisiana Purchase Exposition the Pennsylvania will run a train through between New York and St. Louis in 25½ hours. It is now said that the schedule of the new train which is to be run between these cities by the New York Central and the "Big Four" will be 26 hours instead of 25, as at first reported. The Pennsylvania Lines West of Pittsburg announce two new trains daily between Pittsburg and St. Louis, to be put on in May. The Wabash is to put on a new train between Buffalo and St. Louis.

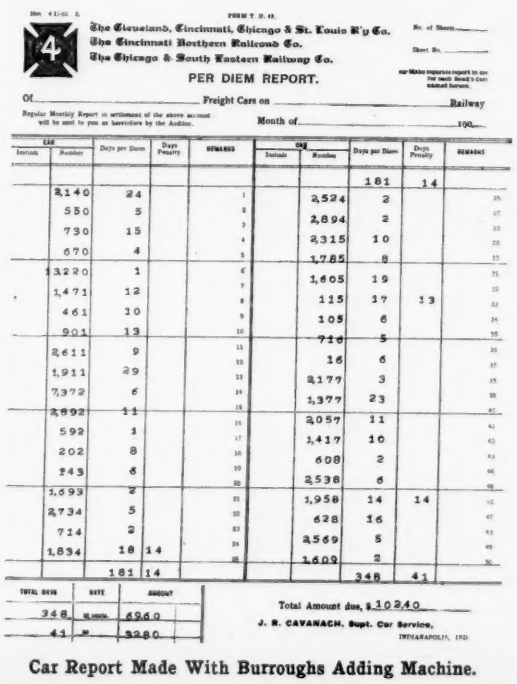
Philadelphia papers announce that the Pennsylvania road is now enforcing the rule that a passenger's baggage shall be checked only to the destination of the ticket on which he begins his journey. If a passenger from Philadelphia to Columbus has a mileage book of the road east of Pittsburg and another of the lines west thereof, his baggage must be checked only to Pittsburg. In other words, if a passenger wishes to check baggage through over two or more roads he must forego the advantage of mileage or other special tickets which have been issued by the different roads separately.

The Supreme Court of Virginia in a suit brought by the Atlantic Coast Line and others, has sustained the demurrage regulations promulgated last summer by the Corporation Commission of the State. The opinion says that the regulations are reasonable and just, and that they are valid except in so far as they may directly entrench upon the interstate commerce clause of the Constitution of the United States or some other clause of that instrument (the fourth amendment) which protects the railroad, and the court seems to say that a new suit will have to be brought to test these Federal questions.

It appears that the philanthropic arrangement that has lately been made by the Southern Pacific for the distribution of second-hand magazines and newspapers in the lonely regions along the company's lines in the Southwest is not confined to the employees of the company, but is intended for the benefit of the people in general. Mrs. Rosine Ryan, the custodian of books and papers in the general passenger agent's office, reports that during the first week she sent out 1,500 papers and pamphlets to 32 section foremen and that the foremen have distributed this matter among 376 families.

Fires.

The Santa Fe shops at Albuquerque, N. Mex., were destroyed by fire on March 18; loss about $35,000. The Pennsylvania freight houses at 29th and Market streets, Philadelphia, were damaged by fire on March 25 to the extent of about $35,000. The Delaware, Lackawanna & Western supply department storehouses at Hoboken, N. J., were damaged by fire on March 27; loss about $25,000.


FORM T. P. O.

The Cleveland, Cincinnati, Chicago & St. Louis R'y Co.
The Cincinnati Northern Railroad Co.
The Chicago & South Eastern Railway Co.

PER DIEM REPORT.

Of _____ Freight Cars on _____ Railway

Regular Monthly Report in settlement of the above account will be sent to you as heretofore by the Auditor.

Month of _____ 190__

CAR Initials	CAR Number	Days per Diem	Days Penalty	REMARKS	CAR Initials	CAR Number	Days per Diem	Days Penalty	REMARKS
							181	14	
	2140	24		1		2524	2		21
	550	5		2		2894	2		22
	730	15		3		2315	10		23
	670	4		4		1785	8		24
	13220	1		5		1605	19		25
	1471	12		6		115	17	13	26
	461	10		7		105	6		27
	901	13		8		716	5		28
	2611	9		9		16	6		29
	1911	29		10		2177	3		30
	7372	6		11		1377	23		31
	2892	11		12		2057	11		32
	592	1		13		1417	10		33
	202	8		14		608	2		34
	243	6		15		2538	6		35
	1693	2		16		1958	14	14	36
	2734	5		17		628	16		37
	714	2		18		2569	5		38
	1834	18	14	19		1602	2		39
		181	14	20			348	41	40

TOTAL DAYS	RATE	AMOUNT
348	[illegible]	6960
41	"	3280

Total Amount due, $ 10240

J. R. CAVANAGH, Supt. Car Service,
INDIANAPOLIS, IND.

Car Report Made With Burroughs Adding Machine.

A Small Crumb for the Railroads.

The Texas Railroad Commission has ruled that men accompanying shipments of live stock and accepting transportation from the railroads must begin their return trip within 24 hours after reaching destination.

The "Railway Exchange," New York.

The ticket and freight office of the Grand Trunk Railway, at 290 Broadway, New York, one of the handsomest offices in the city, has been named by the company the Railway Exchange, 11 other railroads, steamships, or fast freight lines having been taken in as sub-tenants. These other lines are the Great Eastern Fast Freight Line, Lehigh Valley Railroad Co., Maine Steamship Co., Clyde Steamship Co., Queen & Crescent Route, Louisville & Nashville Railroad Co., Wisconsin Central Railroad Co., Central Railroad of New Jersey, The Central States Dispatch, Pere Marquette Railroad Co., and the Georgia Railroad Co.

Snow on the New York Central.

The *Wall Street Journal* quotes a director of the New York Central as follows: "We have spent $1,000,000 shoveling snow this winter. The back of winter, however, is broken and the thousands of freight cars tied up throughout the country will soon be delivering their freight. The railroad equipment of the company is still unable to cope with a severe winter and the amount of freight offering in this growing country. This year we shall have to earn our net money in 10 months instead of 12."

The company broke all records March 25 by moving a total of 27,123 loaded freight cars within 24 hours. This is, of course, exclusive of the Boston & Albany. The best previous record was 488 under this mark.

Floods.

Reports from Albany, N. Y., of March 28, state that a large amount of damage has been caused by floods in the Mohawk Valley. The towpath of the Erie Canal was washed badly between locks 28 and 29, and the canal was seriously damaged between Amsterdam and Fort Plain. The Mohawk division of the New York Central was blocked for 48 hours or more by ice thrown onto the tracks when the frozen river broke up, and trains had to be run over the West Shore Railroad; snow plows were used in some places to remove driftwood and ice. Two bridges over the Mohawk River were carried away, one of them 800 ft. long. The highway bridge over the Susquehanna River at Great Bend, Pa., was carried away by ice on the 25th. At Indianapolis, Ind., the White River overflowed the west part of the city. At Vincennes, on the lower Wabash, the levees gave way. It is estimated that the cities along the White River and its tributaries will sustain a loss of $1,000,000. At Grand Rapids, Mich., on the 26th, the Grand River rose and 3,000 buildings were flooded.

A Large Model.

The exhibit of the Baltimore & Ohio Railroad at St. Louis will include as its chief feature a complete model inside and out of the new Union Station which is to be built at Washington, D. C. This model is as large as an ordinary house. It is 75 x 55 ft. and 30 ft. high. It is complete inside and out and is made of white plaster. It will be the center of a railroad exhibit which occupies 5,500 sq. ft. of floor room.

Already 53 carloads of the exhibit have gone to St. Louis from Chicago and a number from Baltimore to the same destination, with several more to follow. This exhibit will tell the entire history of motive power as applied to land from the first theories of Sir Isaac Newton in the 17th century. A reproduction in actual size of distinctive types of locomotives will be shown, as at Chicago in 1893, and each engine is manned by an engineer and fireman costumed in the garb of the era in which the engine flourished. The figures were made by Sculptor Berge and Clarence Irving Ward, artist. There are about 70 of these figures. Major Pangborn, who has always represented the Baltimore & Ohio at the large world's fairs, is at the head of the present enterprise.—*Baltimore Herald.*

The Chattanooga Case Once More.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has announced its decision in the case of the Chamber of Commerce of Chattanooga against the Southern Railway. The Commission having decided in the old case against the East Tennessee, Va. & Ga. that freight rates from New York and other eastern points were unlawfully higher for the shorter distance to Chattanooga than for the longer distance through Chattanooga to Nashville, and the United States Supreme Court having, in a proceeding to enforce the order of the Commission, refused to direct enforcement of such order and reversed the decisions of the Circuit Court and Circuit Court of Appeals in that proceeding, but "without prejudice to the right of the Commission" to proceed further and "hear and determine the matter in controversy according to law," and the case having come before the Commission for re-investigation upon complaint of the Chamber of Commerce of Chattanooga against lines involved in the original proceeding and also lines reaching Chattanooga and lines reaching Nashville via Cincinnati, it is found, applying the law as construed by the United States Supreme Court, that the traffic from New York and other eastern points is carried to Nashville and Chattanooga under substantially different circumstances and conditions; and the Commission holds that the higher rate to Chattanooga is not unlawful under section four and cannot be otherwise condemned merely because a lower rate is granted to Nashville; and that the rates to

Chattanooga are not shown to be unreasonable within the meaning of section one.

Railroad Regulation in Texas.

The accusations of lying and stealing given below are not taken from a stump speech or a yellow journal, but from an extract, printed in Texas newspapers, from the forthcoming annual report of the Railroad Commission of that State. The Commissioners are L. J. Storey, Allison Mayfield and O. B. Colquitt.

"It is safe to say when the Atchison, Topeka & Santa Fe and Missouri, Kansas & Texas Companies have been induced to disgorge the amounts which we believe that these systems have plundered, by one device and another, for years, that the summary of the income accounts of Texas railroads will show a respectable balance on the opposite side of what it now does.

"It is simply an imposition on the credulity of the public and this Commission that the Missouri, Kansas & Texas, of Texas, on which originated 520,188 bales of the 2,828,563 bales of cotton hauled in Texas during the year ended June 30, 1902, should have reported an income from operation of only $754,880.21 for that year; and the second highest cotton originating road, the Gulf, Colorado & Santa Fe, with 420,537 bales, comes out that year, according to the report for it, with a deficit, after paying operating expenses, taxes and interest on bonds.

"Cotton is regarded by all railroad traffic men in Texas as the cream of the freight business. They fight harder against reductions in the freight rates on it than on any other commodity. Yet the two companies which enjoyed the greatest share of this business figure out in their reports to us deficits sufficient to overwhelm the net credit balance of the remainder of the railroad companies of the State."

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page 16.)

Franklin Institute.

At a meeting of the sections held in Philadelphia, Mar. 31, an address on "Wireless Telegraphy" was delivered by Mr. Lee De Forest, of New York.

Engineers' Club of Minneapolis.

At the meeting of this club in Minneapolis, Mar. 28, an address was delivered by George H. Maxwell, of Chicago, on "The Engineering Problems of the West."

Canadian Railway Club.

The regular monthly meeting of this Club will be held in Montreal, April 5, at McGill University. There will be a continuance of the discussion on "Compound Locomotives," brought over from last meeting; also an illustrated lecture by Dr. E. G. Coker, on "The Effects of Stress on the Microscopic Structure of Metals."

International Ry. Master Boiler-Makers' Association.

This association will hold its annual convention in Indianapolis at the Grand Hotel, beginning May 17. The convention is to be addressed by President W. H. Lewis, of the Railway Master Mechanics' Association, and Governor Durbin, of Indiana. There will also be addresses by J. A. Doarnberger, President of the Association, and others.

American Society of Mechanical Engineers.

On Tuesday evening, March 29, Mr. Julian Kennedy, of Pittsburg, Pa., delivered a lecture on "How Steel Rails Are Made." The meeting was held at the society's house in New York, and the lecture was illustrated by stereopticon views. The process of rail making from the time the ore is mined and shipped to the blast furnaces until the finished rails pass through the rolls, was described in detail. The theory and design of the blast furnace was also discussed. The author thought that the day was not far distant when all rails will be made by the open hearth process in order to get rid of phosphorus. The president announced that Rear-Admiral G. W. Melville, U. S. N. (retired), will deliver a lecture on the last Tuesday in April.

Transportation Club of San Francisco.

The Transportation Club of San Francisco was organized with 150 members at a meeting at the Palace Hotel, March 18. The following officers were elected: President, George J. Bradley, Commercial Agent, Southern Railway; First Vice-President, H. K. Gregory, Assistant General Passenger Agent of the Santa Fe Coast Lines; Second Vice-President, W. J. Shotwell, General Agent of the Gould lines; Secretary, Walter R. Kneiss, Contracting Agent, Merchants' Despatch; Treasurer, W. R. Alberger, Chief Clerk Traffic Department, Santa Fe System. Directors for two years: H. W. Adams, Commercial Agent, Rock Island System; S. F. Booth, General Agent Passenger Department, Union Pacific; W. H. Davenport, General Agent, Colorado Midland; C. D. Dunann, General Passenger Agent, Pacific Coast Steamship Company; Charles D. Taylor, Pacific Coast Passenger Agent, International Mercantile Marine Company. Directors for one year: F. W. Thompson, General Western Agent, Rock Island System; P. K. Gordon, Pacific Coast Passenger Agent, Piedmont Air Line; W. T. Hunter, Traveling Freight Agent, Chicago & Northwestern; C. J. Jones, Agent, Southern Pacific Company. The directors were empowered to secure permanent quarters for the club.

PERSONAL.

—Mr. Brainard Howell, who several years ago was General Eastern Freight Agent of the West Shore Railroad, died at Tenafly, N. J., on March 24, at the age of 63.

—Mr. E. W. Campbell, Division Superintendent of the Texas & Pacific Railway, at Marshall, Texas, was killed on March 29, at Dallas, by being crushed between the cars of a passenger train.

—Captain Andrew B. Frazee, of Camden, N. J., formerly Superintendent of the Pennsylvania Railroad Company's ferries between Philadelphia and Camden, died on March 29, at the age of 84.

—Mr. John R. Savage, who on Friday of this week becomes Chief Engineer of the Long Island Railroad, was

born in Philadelphia in 1868. Mr. Savage is a graduate of the University of Pennsylvania (Civil Engineer), class of 1888. His first railroad service was on the Pennsylvania Railroad, under Chief Engineer Brown. For seven years Mr. Savage worked for the United States Government on river and harbor work on the Pacific Coast. In 1897 he returned to the east and worked for the New York, Philadelphia & Norfolk Railroad. After the close of the war in Cuba (1898) he was made Superintendent of Construction of Piers and Railroads of the United States Government in Havana. For two years he was in western Pennsylvania building branch railroads for the Pennsylvania, and in the Fall of 1900 he went to the Lackawanna Steel Company as Chief Engineer of the Cornwall & Western Railroad. Later he went to Buffalo as Assistant to the General Manager of the Lackawanna Steel Company, acting as Purchasing Agent. In January last Mr. Savage was appointed General Superintendent of the Lackawanna Iron & Steel Company at Lebanon, and had entire charge of furnaces and ore mines for the company at that point. He was also appointed President of the Cornwall Railroad. Mr. Savage's office, as Chief Engineer of the Long Island, will be at Jamaica, N. Y.

—Mr. Francis B. Clarke, who for the past eight years has been General Traffic Manager of the Great Northern, has, owing to ill health, resigned. Mr. Clarke is a native of New York, having been born in Madison County, 66 years ago. His early railroad work was on the Wisconsin Central as General Freight and Passenger Agent. For 14 years, from 1878, he was General Traffic Manager of the Chicago, St. Paul, Minneapolis & Omaha. For a time Mr. Clarke was Manager of the Consolidated Land Company at West Superior, Wis.

—Mr. C. L. Addison, whose promotion to succeed Mr. Potter (Vice-President and General Manager) as General Superintendent of the Long Island Railroad, was recently announced, was born in Reading Pa., in 1867. His early schooling was in Pennsylvania. He graduated from Lehigh University, in the class of 1888, and went to work for the Wharton Switch Company. Two years afterward he entered the service of the Long Island as Signal Engineer. In 1892 he resigned from this company and went to the Johnson Signal Company, but shortly resigned and re-entered the service of the Long Island. From 1897 to 1901 he was General Roadmaster, and in the latter year was promoted to be Superintendent of Transportation, which position he now leaves to become General Superintendent. Mr. Addison has executive ability, is forceful and to quote an officer of the Long Island "he's a fine man and does his best."

—Mr. George H. Ball, Vice-President of the Evansville & Terre Haute Railroad, died at his home in Boston, Mass., recently, at the age of 55. Mr. Ball was a prominent financier and railroad promoter and was also a Director of the Chicago & Eastern Illinois, the Rutland and other railroad companies.

—Mr. Roberts Walker became, on March 1, Assistant to the General Counsel of the Chicago, Rock Island & Pacific Railway, and his office is at 71 Broadway, New York. He is a graduate of Amherst College, of Columbia Law School and, at probably less than 30 years of age, starts actively in the work his father entered after he was 45 years old. The second generation of good material is apt to have the better chance. His father, the Hon. Aldace F. Walker, was a country lawyer, but a great one, with limited chances for using his great abilities or having them widely known until in 1887 his corporate work in Vermont attracted enough attention to secure his appointment as an Interstate Commerce Commissioner. In this morgue-like office he burst the bounds, as did Judge Cooley. As Receiver and later as Chairman of the Board of the Atchison, Topeka & Santa Fe, he quickly became a great railroad executive, a catholic one, with a keen grasp of the duties and proportionate values of all departments. Heredity counts, but involves responsibility, for we expect much.

—Mr. Thomas L. Greene, Vice-President and General Manager of the Audit Company of New York, died at his home in New York City on Sunday last at the age of 53. Mr. Greene was the son of Thomas Lyman Greene, who was for many years the Agent of the Western Railroad (Boston & Albany) at Albany, and was himself for many years in the service of that road, and afterwards of the West Shore. In 1885 he left the West Shore and took up commercial and newspaper work in New York City. He wrote on financial and railroad topics for the *Evening Post*, the *New York Times*, the *Independent* and other papers, and was an occasional contributor to the *Railroad Gazette*, and to the magazines. He was a lucid writer, and his impartiality, his public spirit and his clear insight into corporation technicalities gave exceptional weight to his writings. His studies in railroad and other financial fields led him to write *Corporation Finance*, his best known book. This work, issued by the Putnams in 1897, was received as an authority in its sphere. The Audit Company of New York was organized by Mr. Greene in 1897. It was a pioneer among independent establishments for reporting on railroad properties and accounts.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe (Coast Lines).—G. R. Joughins, Mechanical Superintendent, has resigned. (See Intercolonial.)

Baltimore & Ohio.—F. L. Stuart has been appointed Engineer of Surveys, with headquarters at Baltimore, Md.

Canada Atlantic.—C. J. Smith, General Traffic Manager, has resigned.

Canadian Pacific.—The position of Assistant Superintendent of Rolling Stock for Lines West has been abolished, and William Cross, with the title of Assistant to the Second Vice-President, will have charge of the Mechanical Department of that portion of the road.

H. H. Vaughan, Superintendent of Motive Power, announces the appointment of W. Norman Dietrich as Electrical Engineer, with headquarters at Montreal.

Chicago & Eastern Illinois.—George W. Smith has been appointed Superintendent of Motive Power and Machinery, with headquarters at Danville, Ill., succeeding T. A. Lawes, resigned.

Chicago Great Western.—W. E. Pinckney has been appointed Assistant General Freight Agent, with headquarters at St. Paul, Minn., succeeding W. B. Martin, resigned, effective April 1.

Chicago, Rock Island & Pacific.—Roberts Walker has been appointed Assistant to the General Counsel, with office at New York City.

A. D. Page has been appointed Engineer of Bridges and Buildings and E. J. Relph has been appointed Signal Engineer, both with headquarters at Chicago.

Delaware & Hudson.—The jurisdiction of W. C. Ennis, Master Mechanic at Carbondale Pa., of the Pennsylvania Division, has been extended over the Susquehanna Division. Mr. Ennis' headquarters will be at Oneonta, N. Y.

Georgia Northern.—J. N. Pidcock has been elected President, succeeding his brother, C. W. Pidcock, resigned.

Great Northern.—Francis B. Clarke, General Traffic Manager, has resigned. The work of that department has been divided between Fourth Vice-President J. W. Blabon and G. O. Somers, Assistant to Mr. Blabon.

Illinois Central.—T. F. Barton has been appointed Master Mechanic, with headquarters at Burnside, Ill. R. F. Turnbull has been appointed to succeed Mr. Barton as Master Mechanic at Paducah, Ky.

Intercolonial.—G. R. Joughins, hitherto Mechanical Superintendent of the Atchison, Topeka & Santa Fe Coast Lines, at Los Angeles, has been appointed Superintendent of Motive Power of the Intercolonial, with headquarters at Halifax, N. S.

Lake Shore & Michigan Southern.—R. B. Kendig, hitherto Chief Draftsman, has been appointed Mechanical Engineer. The office of Assistant Superintendent of Motive Power, formerly held by Mr. Vaughan, has been abolished.

Louisiana Railway & Navigation Company.—Clarence Ellerbe has been elected Assistant to the President. Instead of having two Vice-Presidents, as formerly, there will be one, W. F. Taylor, of Shreveport, filling that position. The office of General Manager has been changed to that of Assistant to the President. H. B. Helm has been chosen Secretary and Auditor.

Mexican.—E. J. Shipp has been appointed Master Mechanic, with headquarters at Apizaco, Mex., succeeding G. Brucklacher.

Missouri Pacific.—S. Ennes, Division Superintendent at Nevada, Mo., has resigned. (See Western Maryland.)

Oregon Railroad & Navigation.—E. E. Calvin, hitherto Assistant General Manager of the Oregon Short Line, has been appointed General Manager of the O. R. R. & N., with office at Portland, Ore. He will also have charge of the Southern Pacific Lines in Oregon north of Ashland, with the title of General Manager. (See Union Pacific.)

Oregon Short Line.—See Oregon Railroad & Navigation Company.

Southern.—A. Stewart, hitherto General Master Mechanic, has been appointed Mechanical Superintendent, with headquarters at Washington, D. C., succeeding S. Higgins, resigned, to become General Manager of the New Haven road. Horace Baker, hitherto Superintendent at Charlotte, N. C., has been appointed Assistant General Superintendent of the Eastern District, with headquarters at Greensboro, N. C. The office of C. S. McManus, General Superintendent, has been removed from Greensboro, N. C., to Washington, D. C.; all effective April 1.

Southern Pacific.—Thornwell Fay, General Superintendent of Morgan's Louisiana & Texas and the Louisiana Western, has been appointed General Manager of the Southern Pacific lines in Louisiana and Texas (Morgan's Louisiana & Texas; Texas & New Orleans; Galveston, Harrisburg & San Antonio; Houston & Texas Central). On the Galveston, Harrisburg & San Antonio he will take the duties heretofore belonging to the office of Vice-President, just vacated by C. H. Markham.

W. F. Owens, Superintendent of the M., L. & T. and the L. W., is promoted to be General Superintendent.

See Oregon Railroad & Navigation Company.

Toledo, St. Louis & Western.—J. L. Frazier, General Superintendent, has resigned, effective April 1.

Union Pacific.—A. L. Mohler, hitherto President and General Manager of the Oregon Railroad & Navigation Company, has been chosen President of the U. P. The position has been held by Mr. Harriman since the resignation of Mr. Burt a few weeks ago. Mr. Mohler's office will be at Omaha, Neb.

Western Maryland.—S. Ennes, hitherto Division Superintendent on the Missouri Pacific, has been appointed Superintendent of the W. M., with headquarters at Baltimore, Md. This is a newly created position.

LOCOMOTIVE BUILDING.

The Lake Champlain & Moriah has ordered two locomotives from the Baldwin Locomotive Works.

The Santa Fe, Prescott & Phoenix is having three locomotives built at the Brooks Works of the American Locomotive Co.

The Boston & Maine has ordered 10 mogul (2-6-0) locomotives and 10 switching (0-6-0) locomotives from the American Locomotive Co. for delivery in the fall.

The Atlantic & Birmingham, according to press reports, has ordered 13 simple 10-wheel (4-6-0) locomotives from the Baldwin Locomotive Works. These locomotives will weigh 146,500 lbs.; cylinders, 19 in. x 26 in.; and diameter of drivers, 63 in.

The Huie-Hodge Lumber Co. has ordered one mogul (2-6-0) locomotive from the Davenport Locomotive Works for April, 1904, delivery. This locomotive will weigh 66,000 lbs., with 55,000 lbs. on drivers; cylinders, 14 in. x 20 in.; diameter of drivers, 42 in.; wagon-top boiler with a working steam pressure of 160 lbs., and 160 two-in. tubes 9 ft. long. The special equipment includes: Midvale tires, Monitor injectors, Nathan sight-feed lubricators, American safety valves and steam gages, Washburn couplers, Homestead blow-off cock and Davenport springs and steam brakes. The tender will be equipped with Bettendorf truck and body bolsters and McCord journal boxes.

The Missouri, Kansas & Texas has ordered 10 simple 10-wheel (4-6-0) locomotives, 10 simple mogul (2-6-0) locomotives, and 10 simple six-wheel switching (0-6-0) locomotives from the Schenectady Works of the American Locomotive Co., for April, May and June delivery. The 10-wheel locomotives will weigh 140,000 lbs., with 104,000 lbs. on the drivers; cylinders, 19 in. x 26 in.; diameter of drivers, 57 in.; extended wagon top boilers, with a working steam pressure of 200 lbs.; heating surface, 2,370 sq. ft.; 297 charcoal iron tubes, 2 in. in diameter and 14 ft. 3 in. long; carbon fire-box, 100⅛ in. long and 41⅜ in. wide; grate area, 28.6 sq. ft.; tank capacity, 6,300 gallons of water and 12 tons of coal. The mogul locomotives will weigh 155,000 lbs., with 133,100 lbs. on the drivers; cylinders, 20 in. x 28 in.; diameter of drivers, 63 in.; extended wagon top boilers, with a working steam pressure of 200 lbs.; heating surface, 2,268 sq. ft.; 320 charcoal iron tubes, 2 in. in diameter and 12 ft. 8 in. long; carbon fire-box, 102 in. long and 66 in. wide; grate area, 47 sq. ft.; tank capacity, 6,000 gallons of water and 12 tons of coal. The switching locomotives will weigh 147,000 lbs.; cylinders, 20 in. x 26 in.; diameter of drivers, 57 in.; extended wagontop boilers, with a working steam pressure of 200 lbs.; heating surface, 2,200 sq. ft.; 342 charcoal iron tubes, 2 in. in diameter and 11 ft. 3 in. long; carbon fire-box, 108⅝ in. long and 41⅜ in. wide; grate area, 31.2 sq. ft.; tank capacity, 5,000 gallons of water and coal capacity 16,000 lbs. The special equipment for all includes: Westinghouse air-brakes, steel axles, Simplicity bell ringers, Magnesia boiler lagging, National-Hollow brake-beams, Diamond "S" brake shoes, Major couplers, Pyle Electric headlights for 10-wheel locomotives, Monitor injectors, Jerome piston and valve rod packings, Coale safety valves, Leach sanding devices, Nathan sight-feed lubricators, Railway Steel-Spring Co.'s springs, Ashcroft steam gages, Latrobe driving, truck and tender wheel tires for 10-wheel and mogul locomotives and Latrobe driving wheel tires and cast iron tender wheel tires for switching locomotives and steel wheel centers.

CAR BUILDING.

The Uintah R. R. is reported in the market for 50 dump cars.

The Chihuahua & Pacific is in the market for 60 standard gage flat cars.

The Chicago, Milwaukee & St. Paul is figuring on a number of passenger cars.

The City of Winnipeg, Manitoba, has ordered 25 ballast cars of 80,000 lbs. capacity from the Rodger Ballast Car Co.

The National Despatch Line, Chicago, denies that it is having 200 freight cars built by the American Car & Foundry Co.

The Pennsylvania & Delaware Oil Co. is having 10 freight cars built at the Milton Works of the American Car & Foundry Co.

The Buffalo, Rochester & Pittsburg is having eight coaches built at the Wilmington Works of the American Car & Foundry Co.

The Boston & Maine is about to build 15 refrigerator cars, three baggage cars and three combination cars at the company's shops at Concord, N. H.

The Grand Trunk has ordered six first-class passenger coaches, four cafe, two dining and three combination cars from the Pullman Company, for June, 1904 delivery. This order was reported in our issue of last week.

The Louisiana & Northwest, as reported in our issue of March 11, has ordered four cabooses from the Mt. Vernon Car Mfg. Co., for April, 1904, delivery. The special equipment includes: Damascus brake-beams, Tower couplers, Westinghouse air-brakes and Butler draft rigging.

The Pittsburg & Lake Erie, as reported in our issue of March 25, has ordered 1,000 steel hopper cars of 100,000 lbs. capacity from the Pressed Steel Car Co. for May, 1904, delivery. The special equipment includes: Simplex bolsters, Damascus brake-beams, Westinghouse air-brakes, interlocking brake shoes, Climax couplers, Lawrenceville brasses, twin spring draft rigging, Gould dust guards and journal boxes and Railway Steel-Spring Co.'s springs.

The American Refrigerator Transit Co., as reported in our issue of March 18, has ordered 500 40-ft. refrigerator cars of 60,000 lbs. capacity from the American Car & Foundry Co. for May, 1904, delivery. The special equipment includes: steel axles, Simplex bolsters, Junior brake-beams, Spear-Miller Co.'s brake shoes, Westinghouse air-brakes, More-Jones Brass & Metal Co.'s brasses, Climax couplers, Miner draft rigging, Harrison dust guards, McCord journal boxes and journal-box lids, Monolith paint, Ruberoid roofs, Railway Steel-Spring Co.'s springs and St. Louis Car Wheel Co. and American Car & Foundry Co.'s wheels.

The Baltimore & Ohio, as reported in our issue of March 4, has ordered three dining cars from Barney & Smith, for May delivery. These cars will weigh 120,000 lbs., and measure 70 ft. long, 9 ft. 8 in. wide over sills, and 6 ft. 8½ in. high from sill to plate. The special equipment includes: Diamond special brake-beams, Westinghouse air-brakes, Buhoup couplers, Pantasote curtain material, Miner draft rigging, Gold heating system, Symington journal boxes and lids, Pintsch gas and electric light, Standard steel platforms, B. & O. specification springs, brasses, standard steel-tired wheels and paint, and Pullman standard wide vestibules.

BRIDGE BUILDING.

ARAPAHO, OKLA. T.—Custer County, it is reported, will build ten new steel bridges.

BELLOWS FALLS, VT.—The town of Walpole, N. H., has appropriated $45,000 and Rocingham $25,000 for a new bridge to be built between Bellows Falls and North Walpole.

BINGHAMTON, N. Y.—The Binghamton & Southern, an officer states, will build a steel viaduct 7,800 ft. long; also a large number of steel bridges along the line of its proposed route between Binghamton, N. Y., and Williamsport, Pa. A. K. Harvey is Chief Engineer.

BOSTON, MASS.—The city, it is reported, will borrow $28,000 for rebuilding the Shawmut avenue bridge over the Boston & Albany and New Haven tracks.

CHAMBERSBURG, PA.—The viewers recommend building a new bridge over Antietam Creek near Hoover's Mill.

CINCINNATI, OHIO.—Bids are wanted April 16, by Eugene L. Lewis, County Auditor, for repairs to the east approach of the suspension bridge over Whitewater River.

CLARKSVILLE, VA.—This town has voted $10,000 towards the cost of building a bridge over the Roanoke River.

DELPHI, IND.—Bids are wanted April 4 by the Board of County Commissioners for building three bridges and one arch culvert in Carroll County. John Nevin is one of the Commissioners.

DENVER, COLO.—Bids are wanted April 18 (changed from April 8) by L. G. Carpenter, State Engineer, for building the steel bridge 100 ft. long, with 16-ft. roadway, on stone abutments, over the Yampa River at Steamboat Springs, in Routt County.

DES MOINES, IOWA.—The Board of Public Works has completed plans for building the viaduct over Seventh street, which will be about 2,000 ft. long and include 1,200 ft. of steel work, at a cost of about $180,000. Work will be commenced as soon as the City Engineer has approved the plans.

ELMIRA, N. Y.—The City Council has been asked to pass a resolution to build the Lake street bridge, to cost about $90,000.

FORT SMITH, ARK.—Bids are wanted April 14, by W. A. Falconer, County Judge, for building a steel bridge over Mill Creek, on Wheeler road, Sebastian County.

GOSHEN, IND.—Bids are wanted April 12, by O. H. Sweitzer, County Auditor, for building a 200-ft. iron bridge on stone abutments with 16-ft. roadway over Elkhart River; also for a number of small stone arch bridges.

JEFFERSON CITY, MO.—Bids are wanted May 2 by the Board of County Commissioners for building a steel bridge 55 ft. long over Coon Creek. B. C. Bond, Enon, can give information.

KANSAS CITY, MO.—The Upper House of the Council has passed an ordinance requiring the Belt Line R. R. to build a steel viaduct and approaches over the Broadway crossing, on which work must be commenced within 30 days and completed in one year.

MANCHESTER, VA.—The City Council has authorized an issue of $250,000, 50-year bridge bonds for building a bridge over the James River between this place and Richmond.

MINNESOTA.—On March 24, the U. S. Senate passed the bill authorizing the counties of Sherburne and Wright, Minn., to build a bridge over the Mississippi River. (Feb. 12, p. 119.)

MONTREAL, CAN.—The International Railway Bridge Co., of New Brunswick, is seeking incorporation to build a combined highway and railroad bridge over the Restigouche River at Campbellton. Thomas Malcolm, a railroad contractor, of Campbellton; Thomas Cochran and J. W. Stevens, of Edmonton, and Charles Riordan, of St. Catharines, Ont., are interested in the company.

MONTESANO, WASH.—Bids are wanted April 4, by W. D. Campbell, Chehalis County Auditor, for some bridge work.

NEW YORK, N. Y.—Bids will be opened April 7 by the Commissioner of Bridges for building the bridge over Flushing Creek between Jackson avenue, Newtown, in the Borough of Queens, and Broadway, Flushing. It is to be a steel lift bridge of three spans, each 250 ft. long and 36 ft. wide, with 9-ft. sidewalks, and approaches of 2,870 ft. and 2,080 ft. The center span to be a double leaf rolling lift bridge arch design with an opening of 60 ft.

OMAHA, NEB.—The Chicago, Burlington & Quincy is planning to build a viaduct or subway on L street in South Omaha, at a cost of between $75,000 and $100,000.

PENNSYLVANIA.—On March 24, the U. S. Senate passed the bill authorizing the Eastern Railroad Company to build a bridge over the Monongahela River, in Pennsylvania, which had been previously passed by the House of Representatives. (Feb. 12, p. 119.)

ST. LOUIS, MO.—The City Council has passed the Wabash Bridge bill, which provides for building a bridge over Lindell driveway in Forest Park, at a cost of about $25,000, to replace the present structure.

SAGINAW, MICH.—Bids are wanted April 7, by W. H. Barton, Clerk of the Board of Public Works, for the bridge at Center street, to consist of one swing span and three fixed spans, and including substructure and approaches. Also bids will be received to include plans for a bascule bridge at the same place and for rebuilding the old Genesee avenue bridge.

STILLWATER, MINN.—The City Clerk has been directed to ask bids, April 5, for building an iron bridge over Brown's Creek.

TOPEKA, KAN.—The Chicago, Rock Island & Pacific, it is reported, is preparing to rebuild the steel bridge over the Kaw River.

VERSAILLES, IND.—Bids are wanted April 5 by Nicholas Volz, Auditor of Ripley County, for building a highway bridge over Langhery Creek; also for a bridge over Plum Creek.

VICKSBURG, MISS.—Bids are wanted April 4, by J. D. Laughlin, Chancery Clerk of Warren County, for building a steel bridge over Hatchie Bayou.

WASHINGTON, D. C.—The U. S. Senate on March 24 passed a resolution extending the time for completing the highway bridge over the Potomac River, at Washington, to Feb. 12, 1906.

WICHITA, KAN.—Bids are wanted April 18, by J. M. Chain, County Clerk, for some bridge work in Sedgwick County.

WILLIAMSPORT, IND.—Bids are wanted May 2 for building the bridge at Independence over the Wabash River and one at Williamsport, the total cost of the two structures to be about $90,000. R. L. Winks is County Auditor.

Other Structures.

CHATTANOOGA, TENN.—The Wheland Machine Co., which recently built a new power house, will add a foundry 110 ft. x 200 ft. and put in new machinery.

FLORENCE, KAN.—The Atchison, Topeka & Santa Fe, reports say, will build a new passenger station at a cost of about $22,000, to replace the one recently destroyed by fire. The company is also planning to make a large addition to its roundhouse and build a new freight house.

HARRISON, N. J.—The New Jersey Tube Co., of Newark, N. J., has bought seven acres of land adjoining the Erie R. R. for new shops.

LAKE CHARLES, LA.—The St. Louis, Watkins & Gulf Ry. Co., it is reported, has bought land at a cost of about $46,000, on which it will build freight and passenger stations.

MONCTON, N. B.—Bids are wanted April 5 by D. Pottinger, General Manager of the Intercolonial Ry., for building its new passenger station at Kempt.

MONTREAL, CAN.—Bids are wanted May 5, by David Seath, Secretary of the Harbor Commissioners of Montreal, for building 14 steel sheds of an aggregate length of 6,759 ft. x 95 ft. in width, and two stories high.

NAMPA, IDAHO.—The Oregon Short Line will spend about $70,000 in improvements, to include a new freight house and pumping station.

NEW YORK, N. Y.—Bids will soon be asked by Bridge Commissioner George E. Best for building six tracks on the Williamsburg Bridge, across the East River; also for building temporary stations at both ends. The estimated cost of the work will be between $900,000 and $1,000,000.

OLEAN, N. Y.—Bids are being asked by W. H. Brown, Chief Engineer of the Pennsylvania R. R., Philadelphia, Pa., for putting up a car shop, 192 ft. x 198 ft., which will have modern equipment.

POTTSVILLE, PA.—The Pennsylvania, it is reported, will build machine and bridge shops; also large roundhouse.

SPRINGFIELD, OHIO.—The Springfield Union Depot Co. has been incorporated to build an union passenger station at this place. J. D. Layng, of the C., C., C. & St. L., and E. F. Osborn are interested in the project.

TIPTON, IND.—The Lake Erie & Western, it is reported, will build large car repair shops during the summer.

WACO, TEXAS.—The Missouri, Kansas & Texas will build a new freight house to cost about $75,000.

WHITESTONE, N. Y.—The Long Island R. R., it is reported, has bought land as a site on which it will build repair shops and make other improvements, at a cost of about $30,000.

WILKES-BARRE, PA.—The Delaware & Hudson, reports say, is making plans for building new repair shops.

YORK, PA.—The York Foundry & Machinery Co., recently organized, will build, on its land of 3½ acres, a brick structure 100 ft. x 231 ft. S. F. Laucks is Vice-President, Treasurer and General Manager of the company.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALASKA CENTRAL.—Work will be begun on this new line in Alaska on April 1. The proposed route is from Seward, on Resurrection Bay, north to Lake Kenial and thence through Caribou Pass and Tanana Pass down the Tanana River to Rampart City, a total of about 500 miles. The contract for building this line was let last

July to the Tanana Construction Co. The line has been located and some work has been done on the terminal at Seward. George W. Dickinson is President and C. M. Anderson, of Seattle, Wash., has charge of the work. (See Construction Supplement.)

Bellingham Bay & British Columbia.—J. J. Donovan, President of this road, denies the newspaper reports that the road has been sold to the Great Northern. He says that all construction work has been stopped for the present, but that no sale of the road is pending.

Binghamton & Southern.—An officer writes that the contract for building this line will be let about April 1. The proposed route is from Binghamton, N. Y., through Vestal, St. Josephs, Stevensville, Camptown, Hills Grove and Montoursville to Williamsport, Pa., 116 miles. The work is somewhat heavy, with a maximum curvature of eight degrees and a maximum grade of one per cent. There will be a large number of bridges, one tunnel and one long steel viaduct. A. K. Harvey, Binghamton, N. Y., is Chief Engineer. T. R. Martin, Wilkes-Barre, Pa., is President, and D. E. Baxter, 277 Broadway, New York, General Manager. (March 25, p. 248.)

Birmingham, Columbus & St. Andrews Bay.—A contract is reported let to Thomas Worthington, of Birmingham, Ala., for building the first section of this road from Chipley, Fla., to St. Andrews Bay, 50 miles. The road is projected north from St. Andrews Bay, Fla., through Columbus, Ga., to Birmingham, Ala., a total distance of 360 miles. J. M. Garrett, Montgomery, Ala., is Chief Engineer. (See Construction Supplement.)

Boston & Albany.—Plans have been made for building about 10 miles of new track in the West Springfield yard, in which traffic is frequently congested. About half of this track will be laid at once.

Caspar, South Fork & Eastern.—An officer writes that heavy rains during the early spring have caused a number of washouts and that the progress of the work will be greatly delayed. The line is projected from Caspar, Cal., east to Willits, 35 miles, and will be built by the company's forces. A. E. Krebs, San Francisco, is President and R. S. Andrews, Caspar, Cal., Chief Engineer. (See Construction Supplement.)

Chicago & Pacific.—Incorporation has been granted this company in Wyoming to build a railroad from Casper, Wyo., southwest to Ogden, Utah, about 400 miles. J. B. Bradley and W. B. Rhodes, of Casper, are interested. It is stated that the new company is a project of the Chicago & North Western.

Chicago Great Western.—This company will extend its De Kalb & Great Western branch from a point on the main line in Ogle county, Ill., to Peoria, about 120 miles. The proposed line will pass through the counties of Ogle, Lee, Bureau, Putnam, Marshall and Tazewell.

Chicago, St. Paul, Minneapolis & Omaha.—It is reported that during the summer this company will build an extension from Raddison, Wis., to Park Falls, 10 miles.

Coast Line R. R.—Incorporation has been granted this company in Mississippi to build a railroad from Pass Christian east to Biloxi, 25 miles, paralleling the Louisville & Nashville between these points. W. K. Penney, Gulfport, Miss., is said to be interested.

Columbus, Memphis & Pensacola.—Surveys are reported in progress for this proposed road from Columbus, Miss., north through Aberdeen, 25 miles. W. M. Foster is in charge of the work. Newman Cayce, Aberdeen, Miss., is President. (See Construction Supplement.)

Colorado, Oklahoma & Southwestern.—Location surveys are reported in progress for this proposed road from Weatherford, Okla. T., to Woodward, 100 miles. The surveys are under the direction of P. A. McCarthy & Son, consulting engineers, of Lufkin, Tex. The headquarters of the company for the present will be at Weatherford, and the engineers desire to receive proposals for grading, track laying, etc.

Denver, Enid & Gulf.—It has been announced that this company will soon begin surveys for an extension from Enid, Okla. T., northwest to Hays, Kan., 170 miles. Connection will be made with the Union Pacific at the latter point. The road runs at present between Enid, Okla. T., and Guthrie, 57 miles. E. I. Peckham, Enid, is Vice-President and General Manager. (See Construction Supplement.)

Essex Terminal.—Application is being made at the present session of the Dominion Parliament for an extension of time in which to build this proposed road from Walkerville, Ont., south to Amherstburg, 15 miles. F. A. Hough, of Amherstburg, is acting for the promotors.

Great Southern.—A contract has been awarded to W. F. Nelson, of Seattle, Wash., for building this line from The Dalles, Ore., to Dufur, 30 miles. J. G. Heimrich, Seattle, Wash., is President. (March 18, p. 222.)

Herring Cove.—The New Brunswick Legislature is being asked to grant incorporation to a company to build a railroad from Alma, N. B., to Herring Cove. C. J. Osman, Alma, is acting for the promoters.

Joliet, Newark & Southwestern.—This company has been incorporated in Illinois to build a railroad from Joliet west through Will, Kendall and La Salle counties, 55 miles. H. K. Thunemann, O. L. Miller, N. L. Sweetland and R. C. Bibbins, all of Newark, Ill., are incorporators.

Kettle River Valley.—Surveys are in progress for the proposed North Fork branch of this road from Grand Forks, B. C., to Franklin Camp, 50 miles up the Kettle River. A subsidy of $3,200 per mile was voted the company at the recent session of the Dominion Legislature. (See Construction Supplement.)

Lake Erie & Detroit River.—Application is being made at the current session of the Dominion Parliament for an act authorizing the building of a railroad from Walkerville, Ont., to a point on the Detroit River, near Sandwich. The Pere Marquette is making the application in the name of the Lake Erie & Detroit River.

Louisiana, East & West.—Press reports state that this company will build a railroad from Hesma through Bunkie to Ville Platte, La., 35 miles. W. D. Haas, Bunkie, La., is President.

Louisville & Nashville.—Press reports state that this company will soon begin work on an extension from Myrtlewood, Ala., southwest to Nanafalia, about 10 miles.

Lowville & Beaver River.—At a recent meeting of the directors of this company, it was decided to begin surveys for the location of this road from Lowville, N. Y., through Beaver Falls to Croghan, 10½ miles. C. P. Leonard, Lowville, N. Y., is President. (See Construction Supplement.)

Manilla & Southwestern.—Articles of incorporation have been filed by this company in Arkansas. It is proposed to build a railroad from Manilla, in Mississippi County, to Culberhouse, Craighead County, Ark, a distance of 24 miles. R. L. Williford, V. W. Cowan, C. R. Davis, D. R. Smith and others, of Manilla, Ark., are incorporators.

Marlington & Camden.—A charter has been granted this company in West Virginia to build a railroad from Marlington northwest to Camden-on-Gauley, 30 miles. G. H. Campbell, Kane, Pa., J. N. Campbell, Warren, Pa., and others are incorporators.

Mexican Roads.—The Mexican Government has granted a concession to B. H. Moffat, President of the D., N. & P., and a number of other capitalists, for building a railroad 1,500 miles long in Mexico. The proposed route is from Agua Fria through the State of Sonora to the Gulf of California and thence to the Port of Topolobampo, where connection will be made with the Kansas City, Mexico & Orient.

It is reported that the Grand Mineral R. R., which is being built north from San Jose de Sitio, in the State of Chihuahua, will be continued to Deming, N. Mex., to connect with the Southern Pacific. About 20 miles of the road have already been completed. E. J. Davis, Pittsburg, Pa., is interested.

Minneapolis, St. Paul & Sault Ste. Marie.—An officer writes confirming the report that a contract has been let to Foley Bros., Larson & Co., of St. Paul, Minn., for extending the Glenwood branch from Ottertail, Minn., through Detroit, Erskine, Thief River Falls and Pelan to Emerson. Work will be begun on April 1. Most of the work is light, with a maximum grade of .5 per cent. and a maximum curvature of three degrees. There will be three steel bridges. Thomas Green, Minneapolis, is Chief Engineer. (March 18, p. 222.)

Minnesota Central.—An officer writes that a contract has been awarded to Drake, Marker & Co., Philadelphia, for building this new line from Mankato, Minn., northeast through Gaylord, Litchfield and St. Cloud to Duluth, about 200 miles. The maximum grade will be .5 per cent. and the maximum curvature two degrees. There will be one steel bridge and three trestles. Work will be begun within two or three weeks. C. H. Mackenzie, Gaylord, Minn., is Secretary, and D. H. Beecher, Grand Forks, N. Dak., is President. (March 18, p. 222.)

Mississippi River, Hamburg & Western.—A mortgage for $1,500,000 has been filed by this company with the City Trust Co., of New York. This mortgage covers the line completed and in operation between Luna Landing, Ark., and Blissville, and provides for an extension west to Camden, Ark., 65 miles.

National of Mexico.—It is stated that this company will use the roadbed of the San Gregorio R. R., a narrow gage line 17 miles long, in building its proposed line from Gonzalez Junction to the City of Guanajuato.

Newport & Springview.—This company has been organized in Nebraska to build a railroad from Newport, in Rock County, to Springview, 35 miles. M. F. Harrington, O'Neill, Neb., is President, and E. L. Myers, Newport, Neb., Vice-President.

New River & Pocahontas.—A charter has been granted this company in West Virginia to build a railroad from Hinton, Summers County, in a westerly direction to Dents Creek, Raleigh County, 10 miles. Arthur Dunn, Scranton, Pa., is one of the incorporators.

Newton & Northwestern.—This road has been completed from Fraser, Ia., to Newton, 59 miles, and it is stated that it will be open for traffic on April 1. Connection will be made with the Chicago, Rock Island & Pacific at Mertz. Hamilton Browne, Boone, Ia., is President. (See Construction Supplement.)

Overton County.—A charter has been granted this company in Tennessee, but the proposed route is not stated. J. A. Hargrove, J. B. Hicks, G. W. Dillon and others, of Livingstone, Tenn., are incorporators.

Pennsylvania.—Press reports state that this company will convert its old stock yard at East Liberty, Pa., into a freight yard with a capacity of 2,000 cars.

Philadelphia Rapid Transit.—It is stated that work will soon be begun on the elevated portion of this line from the Schuylkill River, Philadelphia, west to Sixty-second street. Work is now in progress on the subway section east from the Schuylkill River under Market street. Plans for the foundations of the steel supporting girders for the elevated line have been approved by the Board of Highway Supervisors. (March 18, p. 222.)

St. Louis & San Francisco.—An officer denies that this company has let a contract to Johnston Bros. & Faught for building an extension of its Guthrie branch from Chandler, Okla. T., to Okmulgee, Ind. T. (March 25, p. 248.)

Syracuse R. R.—Bids are now being asked by the Syracuse R. R. Co. for grading and masonry work on 20 miles of double-track work between Rochester and Palmyra, N. Y. The contract includes the removal of 30,000 cu. yds. of earth per mile and the building of several concrete structures. T. H. Mathes, Syracuse, N. Y., is Chief Engineer.

Trenton, Lakewood & Atlantic (Electric).—A certificate has been filed with the Secretary of State abandoning a portion of this company's road from Pennington avenue, in Trenton, N. J., to Lakewood, N. J., 38 miles.

Union City, Westchester & Muncie Traction.—Articles of incorporation have been filed by this company in Indiana. It is proposed to build an interurban line from Union City west to Muncie, Ind., 30 miles. W. B. Gebhard, Theo. Shockney and others, of Union City, are incorporators.

Washington & Vandemere.—Press reports state that surveys are in progress on this proposed road from Washington, N. C., southeast to Vandemer, 40 miles. R. T. Bonner, Aurora, N. C., may be addressed.

GENERAL RAILROAD NEWS.

Canadian Northern.—President William Mackenzie has recently returned from England, where he has secured buyers for $9,320,000 in guaranteed debenture stock, the proceeds to be used for building 720 miles of road in the northwest. The bonds are guaranteed by the Canadian Government at 3 per cent. for 50 years. This work comprises the section of 620 miles running from Grand View, Manitoba, to Edmonton, Alberta (about 130 miles of which were completed in 1903), and 100 miles east from Prince Albert. Mr. Mackenzie says that the work will be pushed as rapidly as possible and he expects the entire line will be completed during the latter part of 1905.

Detroit, Flint & Saginaw.—This company has filed a mortgage with the Detroit Trust Co. as trustee to secure $1,000,000 five per cent. twenty year gold bonds. The road is now being built from Saginaw, Mich., to Vassar and from Saginaw to Flint, 43 miles. The bonds are to be issued as the road is constructed, for the following purposes: $430,000 for construction at a rate not exceeding $10,000 per mile; $200,000 for a power station at Frankenmuth; $100,000 for poles, wires, etc.; $75,000 for the purchase of ten passenger coaches; $50,000 to operate the lines of the Saginaw Valley Traction Co., and $100,000 for double-tracking a part of the road. T. E. Tarsney is President and A. S. Nester Secretary. The general office of the company is at Frankenmuth, Mich.

Grand Trunk Pacific.—This company has applied for a subsidy from the Dominion Parliament for building a branch line from a point on Thunder Bay, near Port Arthur, in a northerly direction to a point on the main line near Lake Superior. The branch will give the railroad a direct outlet to Lake Superior and the navigation which it can then utilize with the same advantages as are now enjoyed by the Canadian Northern and the Canadian Pacific. The district between Lake Nepigon and the Canadian Pacific, which will be traversed by this branch, is very mountainous and the work will be heavy. It is stated that the branch will be built at once, so that it may be ready to carry the supplies for the construction of the main line.

Gurley & Paint Rock Valley.—The property of this company is to be sold at public auction on April 4 at Gurley, Ala. The road was projected from Gurley Ala., to Winchester, Tenn., and part of the line was graded several years ago.

Louisville & Nashville.—This company has purchased the Newport & Cincinnati bridge from the Pennsylvania. The price paid for the property was $1,500,000, and the assumption of bonds outstanding against the company amounting to $1,400,000. The Louisville & Nashville has been paying to the Pennsylvania a yearly rental of $115,000 for the use of the bridge.

Northern Central.—This company is planning to build a belt line in conjunction with the Philadelphia, Baltimore & Washington around the City of Baltimore. The estimated cost of this line is $1,000,000, and the object is to relieve the freight congestion which occurs frequently. Surveying parties have been at work for several months and two routes have been submitted to the managements of the railroads. It is stated, however, that work will not be begun until the conditions in the money market have improved.

Pennsylvania.—See Louisville & Nashville above.

Philadelphia, Baltimore & Washington.—See Northern Central above.

Pittsburg, Cincinnati, Chicago & St. Louis.—The report of this company for the calendar year ending Dec. 31, 1903, shows gross earnings of $28,960,821, an increase of $2,500,000. Operating expenses were $22,278,251, leaving net earnings of $6,682,570, an increase of only $8,665 over 1902. Sums of $3,665,292 and $1,316,485 were charged to capital account during the year for construction and equipment. In order to provide for these expenditures an allotment of preferred stock was made, on Dec. 1, 1903, at par to the stockholders to the amount of 10 per cent. of their holdings. This amounted to $4,750,000 of preferred stock. In order to meet the other improvements planned, which include the elevation of tracks in Chicago, the board of directors authorized the creation of $10,000,000 of series F consolidated mortgage bonds bearing interest at four per cent. and running for 50 years; $2,000,000 of this issue have already been issued.

Port Angeles-Pacific.—This company, which was originally chartered to build a railroad from Port Angeles, Wash., to the Pacific Coast, 72 miles, has been reorganized, with J. H. Miller, of New York, as President and General Manager. It is stated that a settlement will soon be made with the creditors of the old company and that work will be resumed on the line. Several miles have been graded from Port Angeles in a westerly direction, and five miles of track have been laid.

Quebec Southern.—The Exchequer Court at Ottawa, Ont., acting on the petition of the Dominion Government, has appointed C. C. Dessaules receiver of this road. The road has not been running for some time, but an arrangement has been made by which it will now be operated in connection with the Intercolonial R. R. It extends from Sorel, Que., to Noyan Junction, 88 miles, with a branch from Montreal to Sorel, 51 miles.

San Diego & Eastern.—A mortgage has been filed by this company with the Los Angeles Title, Insurance & Trust Co. as trustee to secure $10,000,000 of five per cent. 45-year gold bonds. This company was recently incorporated with an authorized capital stock of $10,000,000 to build a railroad from San Diego, Cal., to Yuma, Ariz., 222 miles. Surveys have been in progress for some time and the San Diego & Imperial Construction Co. has recently been organized to build the road. The Bay Shore Terminal R. R. was recently merged with this company. The principal office of the company is at San Diego, Cal. C. W. French is President, A. A. Purman, Vice-President, and J. E. Boal, H. P. Wood and H. H. Peters are directors.

Southern.—The following details have been made public by President Samuel Spencer concerning the $15,000,000 refunding plan which has been under consideration for some time. He says in part: "The company is arranging to fund into five year bonds the $4,000,000 bonds of December 1, 1901, and the certificates of indebtedness issued from time to time since 1897 solely for the purchase of railroads as shown in the annual reports. The certificates and collateral trust bonds aggregate about 14½ millions, the fixed charges are not increased.

Southwest Pennsylvania.—Judge Buffington, of the United States Circuit Court, has ordered this road sold. The Union Trust Co., of New York, recently brought suit to recover $9,997,120 on bonds which had lapsed, and the sale was ordered to take place within 20 days at Geiger, Pa., unless the bonds are paid.